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"Vita sine literis mors est."

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OF

Guy M. Wilson

If thou art borrowed by a friend,
Right welcome shall he be
To read, to study and not to lend,
But to return to me.

Not that imparted knowledge doth
Diminish learning's store;
ks. I find, when often lent,
to me no more.

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with the corners of the
urned down

..... NO.......

LECTURES

ON THE

SCIENCE AND ART OF EDUCATION,

WITH OTHER LECTURES AND ESSAYS.

BY THE LATE

JOSEPH PAYNE,

THE FIRST PROFESSOR OF THE SCIENCE AND ART OF EDUCATION, IN THE COLLEGE
OF PRECEPTORS, LONDON.

TEACHER'S HANDY LIBRARY SERIES.

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THE SCIENCE AND ART OF EDUCATION.

At the beginning of last year I delivered, in this room, a lecture intended to inaugurate the Course of Lectures and Lessons on the Science and Art of Education, which the Council of the College of Preceptors had appointed me to undertake. The experiment then about to be tried was a new one in this country; for, although we have had for some years Colleges intended to prepare Elementary Teachers for their work, nothing of the kind existed for Middle Class and Higher Teachers. As I stated in that Inaugural Lecture, the Council of the College of Preceptors, after waiting in vain for action on the part of the Government or of the Universities, and attempting, also in vain, to obtain the influential co-operation of the leading scholastic authorities in aid of their object,* resolved to make a beginning themselves. They therefore adopted a scheme laid before them by one of their colleagues — a lady — and offered the first Professorship of the Science and Art of Education to me.

We felt that some considerable difficulties lay in the way of any attempt to realize our intentions. Among these, there were two especially on which I will dwell for a few minutes. The first was, the opinion very generally entertained in this country, that there is no Science of Education, that is, that there are no fixed principles for the guidance of the Educator's practice. It is generally admitted that there is a Science of Medicine, of Law, of Theology; but it is *not* generally admitted that there is a corresponding Science of Education. The opinion that there is no such Science was, as we know, courageously uttered by Mr. Lowe, but we also know that there are hundreds of cultivated professional men in England, who silently maintain it, and are practically guided by it. These men, many of them distinguished proficients in the

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* It is pleasant to record the interesting fact, that at the last meeting of the Head Masters' Committee, not only was the principle of a special professional training for teachers theoretically admitted, but steps taken for realizing it. The effective execution of this design will, of course, involve a study of the Science as well as the Art of Education.

Art of teaching, if you venture to suggest to them that there must be a correlated *Science* which determines — whether they are conscious of it or not — the laws of their practice, generally by a significant smile let you know their opinion both of the subject and of yourself. If they deign to open their lips at all, it is to mutter something about "Pedagogy," "frothy stuff," "mere quackery,"* or to tell you point-blank that if there is such a Science, it is no business of theirs: they do very well without it. This opinion, which they, no doubt, sincerely entertain, is, however, simply the product of thoughtlessness on their part. If they had carefully considered the subject in relation to themselves — if they had known the fact that the Science which they disclaim or denounce has long engaged the attention of hundreds of the profoundest thinkers of Germany — many of them teachers of at least equal standing to their own — who have reverently admitted its pretensions, and devoted their great powers of mind to the investigation of its laws, they would, at least, have given you a respectful hearing. But great, as we know, is the power of ignorance, and it will prevail — for a time. There are, however, even now, hopeful signs which indicate a change of public opinion. Only a week ago, a leader in the *Times* called attention to Sir Bartle Frere's conviction expressed in one of his lectures in Scotland, that "the acknowledged and growing power of Germany is intimately connected with the admirable education which the great body of the German nation are in the habit of receiving." The education of which Sir Bartle Frere thus speaks, is the direct result of that very science which is so generally unknown, and despised, because unknown, by our cultivated men, and especially by many of our most eminent teachers. When this educated power of Germany, which has already shaken to its centre the boasted military reputation of France, does the same for our boasted commercial reputation, as Sir Bartle Frere and others declare that it is even now doing, and for our boasted engineering reputation, as Mr. Mundella predicts it will do, unless we look about us in time, the despisers of the Science of education will adopt a different tone, and perhaps confess themselves in error, at all events, they will betake themselves to a modest and respectful silence. No later back than yesterday (January 19) the *Times* contained three letters bearing on Sir Bartle Frere's assertion that the increasing commercial importance of Germany is due mainly to the excellence of German education. One writer refers to the German *Realschulen* or Thing-Schools and to the High Schools of Commerce, in both of which the practical study of matters bearing on real life is conducted. Another writer, an Ex-Chairman of the Liverpool Chamber of Commerce, says,—"I have no hesitation in stating that young Germans make the best business men, and the reason is, that they are usually better educated; I mean by this, they have a more thorough education, which imparts to them accuracy and precision. Whatever they do, is well and accurately done, no detail is too small to escape their attention, and this engenders a habit of thought and mind, which in after life makes them shrewd and thorough men of business. I think the maintenance of our commercial superiority is very much of a schoolmaster's question." A third writer speaks of the young German clerks sent out to the East as "infinitely superior" in education to the class of young men sent out from England, and ends by saying, "Whatever be the cause, there can be no question that the Germans are outstripping us in the race for commercial superiority in the far East."

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* It is remarkable that the dictionary meaning of "quack" is "a boastful pretender to arts he does not understand," so that the asserter of principles as the foundation of correct practice is ignorantly denounced as weak on the very point which constitutes his strength. One may imagine the shouts of laughter with which such a denunciation would be received in an assembly of German experts in education.

Some persons, no doubt, will be found to cavil at these statements; the only comment, however, I think it necessary to make is this—"Germany is a country where the Science of Education is widely and profoundly studied, and where the Art is conformed to the Science." I leave you to draw your own inferences. Without, however, dwelling further on this important matter, though it is intimately connected with my purpose, I repeat that this dead weight of ignorance in the public mind respecting the true claims of the Science of Education, constitutes one of the difficulties with which we have had to contend. The writer of a leading article in the *Times*, January 10, said emphatically, "In truth, there is nothing in which the mass of Englishmen are so much in need of education as in appreciating the value of Education itself." These words contain a pregnant and melancholy truth, which will be more and more acknowledged as time moves on.

But there was another difficulty of scarcely less importance with which we had to contend, and this is the conviction entertained by the general body of teachers that they have nothing to learn about Education. We are now descending, be it remembered, from the leaders to the great band of mere followers, from the officers of the army to the rank and file. My own experience, it may well be believed, of teachers, has been considerable. As the net result of it, I can confidently affirm that until I commenced my class in February last, I never came in contact with a dozen teachers who were not entirely satisfied with their own empirical methods of teaching. To what others had written on the principles of Education, — to what these had reduced to successful practice, — they were, for the most part, profoundly indifferent. To move onward in the grooves to which they had been accustomed in their school days, or if more intelligent, to devise methods of their own, without any respect to the experience, however enlightened, of others, was, and is, the general practice among teachers. For them, indeed, the great educational authorities, whether writers or workers, might as well never have existed at all. In short, to repeat what I said before, teachers, as a class (there are many notable exceptions), are so contented with themselves and their own methods of teaching that they complacently believe, and act on the belief, that they have nothing at all to learn from the Science and Art of Education; and this is much to be regretted for their own sakes, and especially for the sake of their pupils, whose educational health and well-being lie in their hands. However this may be, the fact is unquestionable, that one of the greatest impediments to any attempt to expound the principles of Education lies in the unwarrantable assumption on the part of the teachers that they have nothing to learn on the subject. Here, however, as is often the case, the real need for a remedy is in inverse proportion to the patient's consciousness of the need. The worst teachers are generally those who are most satisfied with themselves, and their own small performances.

The fallacy, not yet displaced from the mind of the public, on which this superstructure of conceit is raised, is that "he who knows a subject can teach it." The postulate, that a teacher should thoroughly know the subject he professes to teach, is by no means disputed, but it is contended that the question at issue is to be mainly decided by considerations lying on the pupil's side of it. The process of thinking, by which the pupil learns, is essentially his own. The teacher can but stimulate and direct, he cannot supersede it. He cannot do the thinking necessary to gain the desired result for his pupil. The problem, then, that he has to solve is how to get his pupil to learn; and it is evident that he may know the subject without knowing the best means of making his pupil know it too, which is the assumed end of all his teaching. He may be an adept in his subject, but a novice in the art of teaching it — an art which has principles, laws, and processes peculiar to itself.

But, again; a man, profoundly acquainted with a subject, may be unapt to teach it by reason of the very height and extent of his knowledge. His mind habitually dwells among the mountains, and he has, therefore, small sympathy with the toiling plodders on the plains below. The difficulties which beset their path have long ceased to be a part of his own experience. He cannot then easily condescend to their condition, place himself alongside of them, and force a sympathy he cannot naturally feel with their trials and perplexities. Both these cases tend to the same issue, and show that it is a fallacy to assert that there is any necessary connection between knowing a subject and knowing how to teach it.

Our experiment was commenced on the 6th of February last. On the afternoon of that day, only seventeen teachers had given in their names as members of the class that was to be formed. In the evening, however, to my surprise, I found no fewer than fifty-one awaiting the lecture. This number was increased in a few weeks to seventy, and on the whole, there have been eighty members in the course of the year. Having brought our little history down to the commencement of the lectures in 1873, I propose to occupy the remainder of our time with a brief account of what was intended, and what has been accomplished by them.

Generally speaking, the intention was to show (1) that there is a Science of Education, that is, that there are principles derived from the nature of the mind which furnish laws for the educator's guidance; (2) that there is an Art founded on the Science, which will be efficient or inefficient in proportion to the educator's conscious knowledge of its principles.

It will be, perhaps, remembered by some now present, that I gave in my Inaugural Lecture a sketch of the manner in which I intended to treat these subjects. As, however, memories are often weak, and require to be humored, and as repetition is the teacher's sheet-anchor, I may, perhaps, be excused if I repeat some of the matter then brought forward, and more especially as I may calculate that a large proportion of my audience were not present last year.

I had to consider how I should treat the Science of Education, especially in relation to such a class as I was likely to have. It

We may know the subject throughly and not be able to teach it for want of method i.e. the science.

was to be expected that the class would consist of young teachers unskilled in the art of teaching, and perhaps even more unskilled in that of thinking. Such in fact they, for the most part, proved to be. Now the Science of Education is a branch of Psychology, and both Education and Psychology, as sciences, may be studied either deductively or inductively. We may commence with general propositions, and work downward to the facts they represent, or upward from the facts to the general propositions. To students who had been mainly occupied with the concrete and practical, it seemed to me much better to commence with the concrete and practical; with facts, rather than with abstractions. But what facts? That was the question. There is no doubt that a given art contains in its practice, for eyes that can truly see, the principles which govern its action. The reason for doing may be gathered from the doing itself. If, then, we could be quite sure beforehand that perfect specimens of practical teaching based on sound principles, were accessible, we might have set about studying them carefully, with a view to elicit the principles which underlie the practice, and in this way we might have arrived at a Science of Education. But then this involves the whole question — Who is to guarantee dogmatically the absolute soundness of a given method of teaching, and if any one comes forward to do this, who is to guarantee the soundness of his judgment? It appears, then, that although we might evolve the principles of medicine from the general practice of medicine, or the principles of engineering from the general practice of engineering, we cannot evolve the principles of education from the general practice of education as we actually find it. So much of that practice is radically and obviously unsound, so little of sequence and co-ordination is there in its parts, so aimless generally is its action, that to search for the Science of Education in its ordinary present practice would be a sheer waste of time. We should find, for instance, the same teacher acting one day, and with regard to one subject, on one principle, and another day, or with regard to another subject, on a totally different principle, all the time forgetting that the mind really has but one method of learning so as really to know, though multitudes of methods may be framed for giving the semblance of knowing. We see one teacher, who is never satisfied until he secures his pupils' possession of clear ideas upon a given subject; another, who will let them go off with confused and imperfect ideas; and a third, who will think his duty done when he has stuffed them with mere words — with husks instead of grain.

It is then perfectly clear that we cannot deduce the principles of true science from varying practice of this kind; and if we confine ourselves to inferences drawn from such practice, we shall never know what the Science of Education is. Having thus shut ourselves off from dealing with the subject by the high *à priori* method, commencing with abstract principles, and also from the unsatisfactory method of reference founded on various, but generally imperfect, practice; and being still resolved, if possible, to get down to a solid foundation on which we might build a fabric of science, we were led to inquire whether *any* system of education is to be found, constant and consistent in its working, by the study of which we might reach the desired end. On looking round we saw that there *is* such a system continually at work under our very eyes, — one which secures definite results, in the shape of positive knowledge, and trains to habit the powers by which these results are gained, — which cannot but be consistent with the general nature of things, because it is *Nature's own.* Here, then, we have what we were seeking for — a system working harmoniously and consistently towards a definite end, and securing positive results — a system, too, strictly educational, whether we regard the development of the faculties employed, or the acquisition of knowledge, as accompanying the development — a system in which the little child is the Pupil, and Nature the educator.

Having gained this stand-point, and with it a conviction that if we could only understand this great educator's method of teaching and see the true connection between the means he employs and the end he attains, we should get a correct notion of what is really meant by education; we next inquire, "How are we to proceed for this purpose?" The answer is, by the method through which other truths are ascertained — by investigation. We must do what the chemist, the physician, the astronomer do, when they study their respective subjects. We must examine into the facts, and endeavor to ascertain, first, what they are; secondly, what they mean. The bodily growth of the child from birth is, for instance, a fact, which we can all observe for ourselves. What does it mean? It means that, under certain external influences — such as air, light, food — the child increases in material bulk and in physical power: that these influences tend to integration, to the forming of a whole; that they are all necessary for that purpose; that the withholding of any one of them leads to disintegration or the breaking up of the whole. But as we continue to observe, we see, moreover, evidences of mental growth. We witness the birth of consciousness; we see the mind answering, through the sense, to the call of the external world, and giving manifest tokens that impressions are both received and retained by it. The child "takes notice" of objects and actions, manifests feelings of pleasure or pain in connection with them, and indicates a desire or will to deal in his own way with the objects, and to take part in the actions. We see that this growth of intellectual power, shown by his increasing ability to hold intercourse with things about him, is closely connected with the growth of his bodily powers, and we derive from our observation one important principle of the Science of Education, that *mind and body are mutually interdependent, and co-operate in promoting growth.*

We next observe that as the baby, under the combined influences of air, light, and food, gains bodily strength, he augments that strength by continually exercising it; he uses the fund he has obtained, and, by using, makes it more. Exercise reiterated, almost unremitting; unceasing movement, apparently for its own sake, as an end in itself; the jerking and wriggling in the mother's arms, the putting forth of his hands to grasp at things near him, the turning of the head to look at bright objects; this exercise, these movements, constitute his very life. He lives in them, and by them. He is urged to exercise by stimulants from without; but the exercise itself brings pleasure with it (*labor ipse voluptas*), is continued on that account, and ends in increase of power. What applies to the body, applies also, by the foregoing principle, to the intellectual powers, which grow with the infant's growth, and strengthen with his strength. Our observation of these facts furnishes us, therefore, with a second principle of education — *Faculty of whatever kind grows by exercise.* Without changing our ground we supplement this principle by another. We see that the great educator who prompts the baby to exercise, and connects pleasure with all his voluntary movements, makes the exercise effectual for the purpose in view by constant reiteration. Perfection in action is secured by repeating the action thousands of times. The baby makes the same movements over and over again; the muscles and the nerves learn to work together, and habit is the result. Similarly in the case of the mind, the impressions communicated through the organs of sense grow from cloudy to clear, from obscure to definite, by dint of endless repetition of the functional act. By the observation of these facts we arrive at a third principle of education: — *Exercise involves repetition, which, as regards bodily actions, ends in habits of action, and as* *regards impressions received by the mind, ends in clearness of perception.*

Looking still at our baby as he pursues his education, we see that this manifold exercise is only apparently an end in itself. The true purpose of the teaching is to stimulate the pupil to the acquisition of knowledge, and to make all these varied movements subservient to that end. This exercise of faculty brings the child into contact with the properties of matter, initiates him into the mysteries of hard and soft, heavy and light, &c., the varieties of form, of round and flat, circular and angular, &c., the attractive charms of color. All this is knowledge, gained by reiterated exercise of the faculties, and stored up in the mind by its retentive power. We recognize the baby as a practical inquirer after knowledge for its own sake. But we further see him as a discoverer, testing the properties of matter by making his own experiments upon it. He knocks the spoon against the basin which contains his food; he is pleased with the sound produced by his action, and more than pleased, delighted, if the basin breaks under the operation. He throws his ball on the ground, and follows its revolution with his enraptured eye. What a wonderful experiment it is! How charmed he is with the effect he has produced! He repeats the experiment over and over again with unwearied assiduity. The child is surely a Newton, or a Faraday, in petticoats. No, he is simply one of nature's ordinary pupils, inquiring after knowledge, and gaining it by his own unaided powers. He is teaching himself, under the guidance of a great educator. His self-teaching ends in development and growth, and it is therefore strictly educational in its nature. In view of these facts we gain a fourth principle of the Science of Education. *The exercise of the child's own powers, stimulated but not superseded by the educator's interference, ends both in the acquisition of knowledge and in the invigoration of the powers for further acquisition.*

It is unnecessary to give further illustrations of our method. Every one will see that it consists essentially in the observation and investigation of facts, the most important of which is that we have before us a pupil going through a definite system of education. We are convinced that it is education, because it develops faculty, and therefore conduces to development and growth. By close observation we detect the method of the master, and see that it is a method which repudiates cramming rules and definitions, and giving wordy explanations, and secures the pupil's utmost benefit from the work by making him do it all himself through the exercise of his unaided powers.* We thus get a clue to the construction of a Science of Education, to be built up, as it were, on the organized compound of body and mind, to which we give the name of baby. Continuing still our observation of the phenomena it manifests, first, in its speechless, and afterwards in its speaking condition, we gain other principles of education; and lastly, colligating and generalizing our generalizations, we arrive at a definition of education as carried on by Nature. This may be roughly expressed thus: — *Natural education consists in the development and training of the learner's powers, through influences of various kinds, which are initiated by action from without, met by corresponding reaction from within.*

Then assuming, as we appear to have a right to do, that this natural education should be the model or type of formal education, we somewhat modify our definition thus —

Education is the development and training of the learner's native powers by means of instruction carried on through the conscious and persistent agency of the formal educator, and depends upon the established connection between the world without and the world within the mind — between the objective and the subjective.

I am aware that this definition is defective, inasmuch as it ignores — or appears to ignore — the vast fields of physical and moral education. It will, however, serve my present purpose, which is especially connected with intellectual education.

Having reached this point, and gained a general notion of a Science of Education, we go on to consider the Art of Education, or the practical application of the Science. We are thus led to examine the difference between Science and Art, and between Nature and Art. Science tells us what a thing is, and why it is what it is. It deals therefore with the nature of the thing, with its relations to other things, and consequently with the laws of its being. Art derives its rules from this knowledge of the thing and and its laws of action, and says, "Do this or that with the thing in order to accomplish the end you have in view., If you act otherwise with it, you violate the laws of its being." Now the rules of Art may be carried out blindly or intelligently. If blindly, the worker is a mere artisan — an operative who follows routine, whose rule is the rule-of-thumb. If intelligently, he is a true artist, who not only knows what he is doing, but why this process is right and that wrong, and who is furnished with resources suitable for guiding normal, and correcting abnormal, action. All the operations of the true artist can be justified by reference to the principles of Science. But there is also a correlation between Nature and Art. These terms are apparently, but not really, opposed to each other. Bacon long ago pointed out the true distinction when he said, *Ars est Homo additus Naturæ* — Art is Nature with the addition of Man — Art is Man's work added to (not put in the place of) Nature's work. Here then is the synthesis of Nature and Man which justifies us in saying that natural education is the type or model of formal, or what we usually call, without an epithet, education, and that the Art of Teaching is the application by the teacher of laws of Science, which he has himself discovered by investigating Nature. This is the keystone of our position; if this is firm and strong, all is firm and strong. Abandon this position and you walk in darkness and doubt, not knowing what you are doing or whither you are wandering — at the mercy of every wind of doctrine.

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* The Bishop of Exeter, in the admirable address which he lately delivered on the occasion of his presiding at the giving of prizes to the successful candidates for schools in union with the College of Preceptors, confirmed in various ways the principles above laid down. This address was delivered since my lecture at the College. It may be found fully reported in the "Educational Times" for February. Among other remarks were the following: — "We often find that when teachers fancy their pupils have obtained a thorough mastery of a subject, they are deceived, because they have not noticed that, in almost imperceptible ways, they have been doing for the pupil what he ought to be doing for himself. I have repeatedly gone into a school, and on examining it, say in arithmetic, have been told by the master, 'It is very strange that the boys do not know it; I thought they knew it thoroughly.' I have always asked them this, 'When you have examined them, have you made them answer for themselves?" And the reply has been, 'Yes, I have left them with themselves except just the very slightest possible help occasionally; just enough to prevent them from wandering about.' That is the whole thing. That very little help is the thing which vitiated the examination altogether; and the test of real mastery is that the knowledge shall be produced [and therefore obtained] without any help at all. When men and women in after-life come to use their knowledge, they will find that the knowledge is really of no use unless they are able to apply it absolutely without assistance, and without the slightest guidance to prevent them falling into the most grievous mistakes."

The artist in education, thus equipped, is ready not only to work himself, but to judge of the work of others. He sees, for instance, a teacher coldly or sternly demanding the attention of a little child to some lesson, say in arithmetic. The child has never been led up gradually to the point at which he is. He has none but confused notions about it. The teacher, without any attempt to interest the child, without exhibiting affection or sympathy towards him, hastily gives him some technical directions, and sends him away to profit by them as he may — simply "orders him to learn," and leaves him to do so alone. Our teacher says, — "This transaction is inartistic. The element of humanity is altogether wanting in it. It is not in accordance with the Science of Education;

it is a violation of the Art. The great educator, in his teaching, presents a motive and an object for voluntary action; and therefore excites attention towards the object by enlisting the feelings in the inquiry. He does not, it is true, show sympathy, because he acts by inflexible rules. But the human educator, as an artist, is bound not only to excite an interest in the work, but to sympathize with the worker. This teacher does neither. His practice ought to exemplify the formula, *Ars* = *Natura* + *Homo*. He leaves out both *Natura* and *Homo*. His *Ars* therefore = 0."

Another case presents itself. Here the teacher does not leave the child alone; on the contrary, is continually by his side. At this moment he is copiously "imparting his knowledge" of some subject to his pupil, whose aspect shows that he is not receiving it, and who therefore looks puzzled. The matter, whatever it is, has evidently little or no relation to the actual condition of the child's mind, in which it finds no links of association and produces no intellectual reaction, and which therefore does not co-operate with the teacher's. He patiently endures, however, because he cannot escape from it, the downpouring of the teacher's knowledge; but it is obvious that he gains nothing from it. It passes over his mind as water passes over a duck's back. The subject of instruction, before unknown, remains unknown still. Our artist teacher, looking on, pronounces that this teaching is inartistic, as not being founded on Science. "The efficiency of a lesson is to be proved," he says, "by the part taken in it by the pupil; and here the teacher does all the work, the pupil does nothing at all. It is the teacher's mind, not the learner's that is engaged in it. Our great master teaches by calling into exercise the *learner's* powers, not by making a display of his own. The child will never learn anything so as to possess it for himself by such teaching as this, which accounts the exercise of his own faculties as having little or nothing to do with the process of learning."

Once more; our student, informed in the Science of Education, watches a teacher who is giving a lesson on language — say, on the mother tongue. This mother tongue the child virtually knows how to use already: and if he has been accustomed to educated society, speaks and (if he is old enough to write) writes it correctly. The teacher puts a book into his hand, the first sentence of which is, "English grammar is the art of speaking and writing the English language correctly." The child does not know what an "art" is, nor what is meant by speaking English "correctly."

If he is intelligent he wonders whether he speaks it "correctly" or not. As to the meaning of "art," he is altogether at sea. The teacher is aware of the perplexity, and desiring to make him really understand the meaning of the word, attempts an explanation. "An art," he says (getting the definition from a dictionary), "is a power of doing something not taught by Nature." The child stares with astonishment, as if you were talking Greek or Arabic. What can be meant by a "power" — what by "being taught by Nature"? The teacher sees that his explanation has only made what was dark before darker still. He attempts to explain his explanation, and the fog grows thicker and thicker. At last he gives it up, pronounces the child stupid, and ends by telling him to learn by rote — that is, by hurdy-gurdy grind — the unintelligible words. *That* at least the child can do (a parrot could be taught to do the same), and he does it; but his mind has received no instruction whatever from the lesson — the intelligence which distinguishes the child from the parrot remains entirely uncultivated.

Our teacher proceeds to criticise. "This is," he says, "altogether inartistic teaching." Our great master does not begin with definitions — and indeed gives no definitions — because they are unsuited to the pupil's state of mind. He begins with facts which the child can understand, because he observes them himself. This teacher should have begun with facts. The first lesson in Grammar (if indeed it is necessary to teach Grammar at all to a little child) should be a lesson on the *names* of the *objects* in the room — objects which the child sees and handles, and knows by seeing and handling — that is, has ideas of them in his mind. "What is the name of this thing and of that?" he inquires, and the child tells him. The ideas of the things, and the names by which they are known, are already associated together in his consciousness, and he has already learned to translate things into words. The teacher may tell him (for he could not discover it for himself) that a *name* may also be called a *noun*. "What then," the teacher may say, "is a noun?" The child replies, "*A noun is a name of a thing.*" He has constructed a definition himself — a very simple one certainly — but then it is a definition which he thoroughly understands because it is his own work. This mode of proceeding would be artistic, because in accordance with Nature. There would be no need to commit the definition to memory, as a mere collection of words, because what it means is already committed to the understanding which will retain it, because it represents facts already known and appreciated. Thoroughly *knowing* things is the sure way to *remember* them."

In some such way as this our expert brings the processes commonly called teaching to the touchstone of his Science, the Science which he has built up on his observation of the processes of Nature.

I am afraid that, in spite of my illustrations, I may still have failed to impress you as strongly as I wish to do with the cardinal truth, that you cannot get the best results of teaching unless you understand the mind with which you have to deal. There are, indeed, teachers endowed with the power of sympathizing so earnestly with children, that in their case this sympathy does the work of knowledge, or rather it is knowledge unconsciously exercising the power proverbially attributed to it. The intense interest they feel in their work almost instinctively leads them to adopt the right way of doing it. They are artists without knowing that they are artists. But, speaking generally, it will be found that the only truly efficient director of intellectual action is one who understands intellectual action — that is, who understands the true nature of the mind which he is directing. It is this demand which we make on the teacher that constitutes teaching as a psychological art, and which renders the conviction inevitable that an immense number of those who practise it do so without possessing the requisite qualifications. They undertake to guide a machine of exquisite capabilites, and of the most delicate construction, without understanding its construction or the range of its capabilities, and especially without understanding the fundamental principles of the science of mechanics. Hence the telling, cramming, the endless explaining, the rote learning, which enfeeble and deaden the native powers of the child; and hence, as the final consequence, the melancholy results of instruction in our primary schools, and the scarcely less melancholy results in schools of higher aims and pretensions, all of which are the legitimate fruit of the one fundamental error which I have over and over again pointed out.

In accordance with these views, it has been insisted on throughout the entire Course of Lectures, that teaching, in the true sense of the term, has nothing in common with the system of telling, cramming, and drilling, which very generally usurps its name. The teacher, properly so called, is a man who, besides knowing the subject he has to teach, knows moreover the nature of the mind which he has to direct in its acquisition of knowledge, and the best methods by which this may be accomplished. He must know the subject of instruction thoroughly, because, although it is not he but the child who is to learn, his knowledge will enable him to suggest the points to which the learner's attention is to be directed; and besides, as his proper function is to act as a guide, it is important that he should have previously taken the journey himself. But we discountenance the notion usually entertained that the teacher is to know *because* he has to *communicate* his *knowledge* to the learner; and maintain, on the contrary, that his proper function as a teacher does *not* consist in the communication of his own knowledge to the learner, but rather in such action as ends in the learner's acquisition of knowledge for himself. To deny this principle is to give a direct sanction to telling and cramming, which are forbidden by the laws of education. To tell the child what he can learn for himself, is to neutralize his efforts; consequently to enfeeble his powers, to quench his interest in the subject, probably to create a distaste for it, to prevent him from learning how to learn — to defeat, in short, all the ends of true education. On the other hand, to get him to gain knowledge for himself stimulates his efforts, strengthens his powers, quickens his interest in the subject and makes him take pleasure in learning it, teaches him how to learn other subjects, leads to the formation of habits of thinking; and, in short, promotes all the ends of true education. The obvious objection to this view of the case is, that as there are many things which the child cannot learn by himself, we must of course tell him them. My answer is, that the things which he cannot learn of himself are things unsuited to the actual state of his mind. His mind is not yet prepared for them; and by forcing them upon him prematurely, you are injuriously anticipating the natural course of things. You are cramming him with that which, although it may be knowledge to you, cannot possibly be knowledge to him. Knowing, in relation to the training of the mind, is the result of learning; and learning is the process by which the child teaches himself; and he teaches himself — he can only teach himself — by personal experience. Take, for instance, a portion of matter which, for some cause or other, interests him. He exercises his senses upon it, looks at it, handles it, &c., throws it on the ground, flings it up into the air; and while doing all this, compares it with other things, gains notions of its color, form, hardness, weight, &c. The result is, that without any direct teaching from you, without any *telling*, he knows it through his personal experience — he knows it, as we say, of his own knowledge; and has not only learned by himself something that he did not know before, but has been learning how to learn. But supposing that you are not satisfied with his proceeding thus naturally and surely in the career of self-acquisition, and you tell him something which he could not possibly learn by this method of his own. Let it be, for instance, the distance of the sun from the earth, the superficial area of Sweden, &c. When you have told him that the sun is 95 millions of miles from the earth, that the area of Sweden is so many square miles, you have evidently transcended his personal experience. What you have told him, instead of being knowledge gained, as in the other case, at first hand, is information obtained probably at tenth or even fiftieth hand, even by yourself, and is therefore in no true sense of the word "knowledge" even to you, much less is it knowledge to him; and in telling it to him prematurely, you are cramming and not teaching him. Dr. John Brown ("Horæ Subsecivæ," Second series, p. 473) well says, — "The great thing with knowledge and the young is to secure that it shall be their own; that it be not merely external to their inner and real self, but shall go *in succum et sanguinem;* and therefore it is that the self-teaching that a baby and a child give themselves remains with them for ever. It is of their essence, whereas what is given them *ab extra*, especially if it be received mechanically, without relish, and without any energizing of the entire nature, remains pitifully useless and *wersh* (insipid). Try, therefore, always to get the resident teacher *inside the skin*, and who is for ever giving his lessons, to help you, and be on your side." You easily see from these remarks of Dr. Brown's that he means what I mean; — that matters of information obtained by other people's research, and which is true knowledge to those who have lawfully gained it, is not knowledge to a child, who has had no share in the acquisition, and your dogmatic imposition of it upon his mind, or rather memory only, is of the essence of cramming. Such information is merely patchwork laid over the substance of the cloth as compared with the texture of the cloth itself. It is *on*, but not *of*, the fabric. This expansive and comprehensive principle — which regards all learning by mere rote, even of such matters as multiplication-table or Latin declensions — before the child's mind has had some preliminary dealing with the facts of Number or of Latin — as essentially cramming, and therefore anti-educational in its nature — will be of course, received or rejected by teachers, just in proportion as they receive or reject the conception of an art of teaching founded on psychological principles.

And this brings me to the next point for special consideration. I said that the teacher who is to direct intellectual operations should understand what they are. He should, especially as a teacher of little children, examine well the method, already referred to, by which they gain all their elementary knowledge by themselves, by the exercise of their own powers. He should study children in the concrete, — take note of the causes which operate on the will, which enlist the feelings, which call forth the intellect, — in order that he may use his knowledge with the best effect when he takes the place of the great natural educator. To change slightly Locke's words, he is to "consider the operation of the discerning faculties of a child as they are employed about the objects which they have to do with;" and this because it is his proper function as a teacher to guide this operation. And if he wishes to be an accomplished teacher — a master of his art — he should further study the principles of Psychology, the true groundwork of his action, in the writings of Locke, Dugald Stewart, Bain, Mill, and others, who show us what these principles are. This study will give a scientific compactness and co-ordination to the facts which he has learned by his own method of investigation.

But it may be said, Do you demand all this preparation for the equipment of a mere elementary teacher? My reply is, I require it because he *is* an elementary teacher. Whatever may be done in the case of those children who are somewhat advanced in their career, and who have, to some extent at least, learnt how to learn, it is most of all important that in the beginning of instruction, and with a view to gain the most fruitful results from that instruction, the earliest teacher should be an adept in the Science and Art of Education. We should do as the Jesuits did in their famous schools, who, when they found a teacher showing real skill and knowledge in teaching the higher classes, *promoted* him to the charge of the lowest. There was a wise insight into human nature in this. Whether the child shall love or hate knowledge, — whether his fundamental notions of things shall be clear or cloudy, — whether he shall advance in his course as an intelligent being, or as a mere machine, — whether he shall, at last, leave school stuffed with crude, undigested gobbets of knowledge, or possessed of knowledge assimilated by his own digestion, and therefore a source of mental health and strength, — whether he shall be lean, atrophied, weak, destitute of the power of self-government and self-direction, or strong, robust, and independent in thought and action, — depends almost altogether on the manner in which his earliest instruction is conducted, and this again on the teacher's acquaintance with the Science and Art of Education.

But besides knowing the subject of instruction, and knowing the Art of Education founded on the Science, the accomplished teacher should also know the methods of teaching devised or adopted by the most eminent practitioners of his art. A teacher, even when equipped in the manner I have suggested, cannot safely dispense with the experience of others. In applying principles to practice there is always a better or a worse manner of doing so, and one may learn much from knowing how others have overcome the difficulties at which we stumble. Many a teacher, when doubtful of the principles which constitute his usual rule of action, will gain confidence and strength by seeing their operation in the practice of others, or may be reminded of them when he has for the moment lost sight of them. Is it nothing to a teacher that Plato, Aristotle, Plutarch, Quintilian, in ancient times; Ascham, Rousseau, Comenius, Sturm, Pestalozzi, Ratich, Jacotot, Fröbel, Richter, Herbart, Beneke, Diesterweg, Arnold, Spencer, and a host of others in modern times, have written and worked to show him what education is both in theory and practice? Does he evince anything but his own ignorance by pretending to despise or ignore their labors? What would be said of a medical practitioner who knows nothing of the works or even the names of Celsus, Galen, Harvey, John Hunter, Sydenham, Bell, &c., and who sets up his empirical practice against the vast weight of their authority and experience? I need not insist on this argument; it is too obvious. Much time, therefore, has been devoted, during the year, to the History of Education in various countries and ages, and to the special work of some of the great educational reformers. In particular, the methods of Ascham, Ratich, Comenius, Pestalozzi, Jacotot, and Fröbel have been minutely described and criticised.

And now it is only right to endeavor, in conclusion, to answer the question which may be fairly asked, "After all, what have you really accomplished by this elaborate exposition of principles and methods? You have had no training schools for the practice of your students; it has all ended in talk." In reply to this inquiry or objection, I have a few words to say. The students whom I have been instructing are for the most part teachers already, who are practising their art every day. My object has been so forcibly to stamp upon their minds a few great principles, so strongly to impress them with convictions of the truth of these principles, that it should be impossible, in the nature of things, for them as my disciples, to act in contradiction or violation of them. Whenever, in their practice, they are tempted to resort to drill and cram, I know, without being there to see, that the principles which have become a part of their being, because founded on the truths of nature recognized by themselves, rise up before them and forbid the intended delinquency. In this way, without the apparatus of a training school, the work of a training school is done.

But, in order to show that I am not talking at random, I will quote a few passages from exercises written by the students themselves, relative to their own experience:—

"Before attending these Lectures, my aim was that my pupils should gain a certain amount of knowledge. I now see how far more important is the exercise of those powers by which knowledge is gained. I am therefore trying to make them think for themselves. This, and the principle of repetition, which has been so much insisted upon, prevents us from getting over as much ground as formerly, but I feel that the work done is much more satisfactory than it used to be. I now try to adapt my plan to the pupil, not the pupil to my plan. I used to prepare a lesson (say in history) with great care; all the information which I thus laboriously gained, I imparted to my pupils in a few minutes. I now see that, though I was benefited by the process, my pupils could have gained but little good from it. The fact of having a definite end in view gives me confidence in my practice. The effect of these Lectures, as a whole, has been to give me a new interest in my work."

"I knew before that the ordinary 'learn by rote' method was not real education; but being unacquainted with the Science upon which the true art of instruction is founded, all my ideas on the subject were vague and changeable, and I often missed the very definite results of the 'hurdy-gurdy' system without altogether securing any better ones.

"I have learned that the only education worthy of the name is based upon principles derived from the study of child-nature, and from the observation of nature's methods of developing and training the inherent powers of children from the very moment of their birth. I have had my eyes opened to observe these processes, and now see much more in the actions of little children than I formerly did. More than this, I have learned to apply the principles of nature to the processes of formal education, and by them to test their value and rightness, so that I need no longer be in doubt and darkness, but have sure grounds to proceed upon under any variation of circumstances.

"Lastly, I have learned to reverence and admire the great and good, who in different ages and various countries have devoted their minds to the principles or the practice of education, whose thoughts, whose successes, whose very failures are full of instruction for educators of the present day, especially for those who, having been guided to the sure basis upon which true education rests, are in a position to judge of the value of their different theories and plans, and to choose the good and refuse the evil."

"What you have done for me, I endeavor to do for my pupils. I make them correct their own errors; indeed, do their own work as much as possible. Since you have been teaching me, my pupils have progressed in mental development as they have never done in all the years I have been teaching. Though from want of power and early training I have not done you the justice which many of your pupils have, still you have set your seal upon me, and made me aim at being, what I was not formerly, a scientific teacher."

". . . And now to turn to the modifications introduced into my practice by these Lectures. I was delighted with them, and was more astonished as each week passed at what I heard. New light dawned upon me, and I determined to profit by it. I soon saw some of the prodigious imperfections in my teaching, and set about remedying them. My 'pupils should be self-teachers,' then I must treat them as such. I left off telling them so much, and made them work more. I discontinued correcting their exercises, and made them correct them themselves. I made them look over their dictation before they wrote it, and, when it was finished, referred them to the text-book to see whether they had written it correctly. . . . Time would fail me to give in detail all the alterations introduced into my practice."

"In conclusion, considering what my theory and practice were when I entered your class, I am convinced that the benefits I have derived as regards both are as follows:—(1) I have learned to observe, (2) to admire, (3) to imitate, and (4) to follow, Nature. My theories have become based on the firm foundation of principles founded on facts; my practice (falling far short of the perfection that I aim at attaining) is nevertheless in the spirit of it. And although in all probability I shall never equal any of these great teachers whose lives and labors you have described, yet I know that I shall daily improve in my practice if I hold fast to the principles that you have laid down. I consider you have shown me the value of a treasure that I unconsciously possessed—I mean the power of observing Nature, and therefore I feel towards you the same sort of gratitude that the man feels towards the physician who has restored his sight."

These expressions will show that my labors, however imperfect, have not ended in mere talk.

And now it is time to set you free from the long demand I have made on your patience. I have studiously avoided in this Lecture tickling your ears with rhetorical flourishes. My great master, Jacotot, has taught me that "rhetoric and reason have nothing in common." I have therefore appealed to your reason. I certainly might have condensed my matter more; but long experience in the art of intellectual feeding has convinced me that concentrated food is not easy of digestion. But for this fault — if it be one — and for any other, whether of commission or omission, I throw myself on your indulgent consideration.

LECTURES ON EDUCATION.

LECTURE I.*

THE THEORY OR SCIENCE OF EDUCATION.

It is proposed, in this course of three Lectures, to treat of, 1st, The Theory or Science of Education; 2nd, The Practice or Art of Education; 3rd, Educational Methods, or special applications of the Science and Art.

The Science of Education is sometimes called Pedagogy or Paideutics, and the Art of Education, Didactics. There seems, however, no need for these technical terms. The expressions Science and Art of Education are explicit, and sufficiently answer the purpose.

The Theory or Science, as distinguished from the Practice or Art, embraces an enquiry into the principles on which the Practice or Art depends, and which give reasons for the efficiency or inefficiency of that practice. I do not profess in this Lecture to construct the Science of Education — that still waits for its development. As, however, its ultimate evolution depends very much on a general recognition of its value and importance, I propose to indicate a few of its principles, as well as some of the sources from which they may be derived; and further, to show the need for their application to the present condition of the art.

In the progress of knowledge, practice ever precedes theory. We do, before we enquire why we do. Thus the practice of language goes before the investigation into its laws, and the Art before the Science of Music. It is the same with Education. The practice has long existed; but the theory has, as yet, been only partially recognized. As, however, theory re-acts on practice, and improves it, we may hope to see the same results in Education, when it shall be scientifically investigated.

As the terms Education and Instruction will frequently occur in these Lectures, it may be convenient at the outset to enquire into their exact meaning.

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* Delivered at the House of the Society of Arts, on 12th July, 1871; Professor Huxley, LL.D., in the Chair.

The verb *educare*, from which we get our word *educate*, differs from its primitive *educere* in this respect, that while the latter means to draw forth by a single act, the former, as a sort of frequentative verb, signifies to draw forth frequently, repeatedly, persistently, and therefore strongly and permanently; and in a secondary sense to draw forth faculties, to train or educate them. An educator is therefore a trainer, whose function it is to draw forth persistently, habitually and permanently, the powers of a child, and education is the process which he employs for this purpose.

Then as to Instruction. The Latin verb *instruere*, from which we derive *instruct*, means to place materials together, not at random, but for a purpose—to pile or heap them one upon another in an orderly manner, as parts of a preconceived whole. Instruction, then, is the orderly placing of knowledge in the mind, with a definite object. The mere aggregation, by a teacher, in the minds of his pupils, of incoherent ideas, gained by desultory and unconnected mental acts, is no more *instruction* than heaping bricks and stones together is building a house. The true instructor is never contented with the mere collection of materials, however valuable in themselves, but continually seeks to make them subservient to the end he has in view. He is an educational Amphion, under whose influence the bricks and stones move together to the place where they are wanted, and grow into the form of a harmonious fabric.

Instruction, thus viewed, is not as some conceive of it, the antithesis of Education, nor generically distinct from it. Every educator is an instructor; for education attains its ends through instruction; but, as will be shown, the instructor who is not also consciously an educator, fails to accomplish the highest aims of his science. The instruction which ends in itself is not complete education.

But we will now attempt to give a definition of Education.

Education, in its widest sense, is a general expression that comprehends all the influences which operate on the human being, stimulating his faculties to action, forming his habits, moulding his character, and making him what he is.* Though so powerfully affected by these influences, he may be entirely unconscious of them. They are to him as "the wind which bloweth where it listeth; but he knows not whence it cometh nor whither it goeth." They are not, however, less real on this account. The circumstances by which he is surrounded — the climate, the natural scenery, the air he breathes, the food he eats, the moral tone of the family life, that of the community — all have a share in converting the raw material of human nature, either into healthy, intelligent, moral and religious man; or, on the contrary, in converting it into an embodiment of weakness, stupidity, wickedness, and misery. Thus external influences automatically acting upon a neutral nature, produce, each after its kind, the most opposite results. In this sense the poor little gamin of our streets, who defiles the air with his blasphemies, whose thoughts are of the dirt, dirty, who picks our pockets with a clear conscience, has been duly *educated* by the impure atmosphere, the squalid misery, the sad examples of act and speech presented to him in his daily life — to be the outcast that he is. Such instances show the wondrous power of the education of circumstances.

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* "Whatever," says Mr. J. S. Mill, "helps to shape the human being, to make the individual what he is, or hinder him from being what he is not, is part of his education."—*Inaugural Address delivered at St. Andrew's.*

It is a noticeable characteristic of this kind of education, that its pupils rarely evince of their own accord any desire for improvement, and are in this respect scarcely distinguishable from barbarians. The savages of our race remain savages, not because they have not the same original faculties as ourselves — faculties generally capable of improvement — but because they have no desire for improvement. Nature does indeed furnish her children with elementary lessons. She teaches them the use of the senses, language, and the qualities of matter, but she leaves them to procure advanced knowledge for themselves, while she implants in their minds neither motive nor desire for its acquisition. The differentia of the savage is, that he has rarely any wish for self-elevation. It is sad to think how many savages of this kind we have still amongst ourselves!

But education is conscious as well as unconscious. Some cause or other suggests the desire for improvement. The teacher appears in the field, and civilisation begins its career. The civilization which we contrast with barbarism is simply the result of that action of mind on mind which carries forward the teaching of Nature — in other words, of what we call education. Where there is no specific conscious education, there is no civilization. Where education is fully appreciated, the result is high civilization; and generally, as education advances, civilization advances in proportion, and thus affords a measure of its influence. It follows, then, that all the civilization that exists is ultimately due to the educator, including, of course, the educator in religion.

Education, then, as we may now more specifically define it, is the training carried on consciously and continuously by the educator, and its object is to convert desultory and accidental force into organized action, and its ultimate aim is to make the child operated on by it capable of becoming a healthy, intelligent, moral and religious man; or it may be described as the systematization of all the influences which the Science of Education recognizes as capable of being employed by one human being to develop, direct, and maintain vital force in another, with a view to the formation of habits.

This conception of the end of education defines the function of the educator. He has to direct forces already existing to a definite object, and in proportion as his direction is wise and judicious will the object be secured.

He has in the child before him an embodiment of animal, intellectual, and moral forces, the action of which is irregular and fortuitous. These forces he has to develop further, direct, and organize. The child has an animal nature, affected by external influences, and endowed with vital energies, which may be used or abused to his weal or woe. He has also an intellectual nature, capable of indefinite development, which may be employed in the acquisition of knowledge, and gain strength by the very act of acquisition; but which may, on the other hand, through neglect, waste its powers, or by perversion abuse them. He has, moreover, a moral nature capable by cultivation of becoming a means of usefulness and happiness to himself and others, or of becoming by its corruption the fruitful source of misery to himself and the community.

It is the business of the educator, by his action and influence on these forces, to secure their beneficial and avert their injurious manifestation — to convert this undisciplined energy into a fund of organized self-acting power.

In order to do this efficiently, he ought to understand the nature of the phenomena that he has to deal with; and his own training as a teacher ought especially to have this object in view. Without this knowledge, much that he does may be really injurious, and much more of no value.

To speak technically, then, a knowledge of what is going on in his pupils' bodies, minds, and hearts, their subjective process, will regulate the means which he adopts to direct the action of those bodies, minds, and hearts, which is his objective process — the one being a counterpart of the other — and the consideration of what this knowledge consists of, and how it may be best applied, constitutes the Theory or Science of Education.

I am well aware that the mention of the words "Theory of Education," and the assumption that the educator ought to be educated in it, is apt to excite some degree of opposition in the minds of those who claim especially the title of "practical teachers," and who therefore characterize this theory as "a quackery." Now a quack, the dictionary tells us, is "one who practices an art without any knowledge of its principles." There seems, then, to be a curious infelicity of language in calling a subject which embraces principles, which especially insists on principles, a quackery. If education, thus viewed, is a quackery, then the same must be said of medicine, law, and theology; and it would follow that the greatest proficient in the principles of these sciences must be the greatest quack — a remarkable *reductio ad absurdum.* This position, then, will perhaps hardly be maintained.

But there is a second line of defence. The practical teachers say — and, doubtless say sincerely — "We don't want any Theory of Education; our aim is practical, we want nothing but the practical." We agree with them as to the value, the indispensable value, of the practical, but not as to the assumed antagonism between theory and practice. So far from being in any strict sense opposed, they are identical. Theory is the general, practice the particular expression of the same facts. The words of the theory interpret the practice; the propositions of the science interpret the silent language of the art. The one represents truth *in posse*, the other *in esse;* the one, as Dr. Whewell well remarks, *involves*, the other *evolves*, principles. So in Education, theory and practice go hand-in-hand; and the practical man who denounces theory is a theorist in fact.* He does not of course drive blindly on, without caring whither he is going; the conception, then, which he forms of his end, is his theory. Nor does he act without considering the means for securing his object. This consideration of the means as suitable or unsuitable for his purpose, is again his theory. In fact, the reasons which he would give for his actual practice, to account for it or defend it, constitute, whether he admits it or not, his theory of action. All that we ask, is that this conception of theory, in relation to education, should be extended and reduced to principles.

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* "Theory and practice always act upon each other; one can see from their works what men's opinions are; and from their opinions predict what they will do."—*Goethe.*

Mr. Grove, the eminent Q.C., in an address given at St. Mary's Hospital, forcibly expresses the same opinion: — "If there be one species of cant," he says, "more detestable than another, it is that which eulogizes what is called the *practical man* as contradistinguished from the *scientific*. If, by practical man, is meant one who, having a mind well stored with scientific and general information, has his knowledge chastened and his theoretic temerity subdued, by varied experience, nothing can be better; but if, as is commonly meant by the phrase, a practical man means one whose knowledge is only derived from habit or traditional system, such a man has no resource to meet unusual circumstances; such a man has no plasticity; he kills a man according to rule, and consoles himself, like Moliere's doctor, by the reflection that a dead man is only a dead man, but that a deviation from received practice is an injury to the whole profession."

Practical teachers may, however, admit that they have a theory, an empirical theory, of their own which governs their practice, and yet deny that the generalisation of this theory into principles would be of any value to themselves or to the cause of education. They may go further still, and deny both that there is or can be any Science of Education. Some do, indeed, deny both these positions. It has already been admitted that the Science of Education is as yet in a rudimentary condition. There is at present no such code of indisputable laws to test and govern educational action as there is in many other sciences. Its principles lie disjointed and unorganized in the sciences of Physiology, Psychology, Ethics, and Logic, and will only be gathered together and codified when we rise to a high conception of its value and importance. Even now, however, they are acknowledged in the discussion of such questions as, the best method of training the natural faculties of children — the order of their development — the subjects proper for the curriculum of instruction — book teaching *versus* oral — the differentia of female education — school discipline — moral training, and a multitude of others which will one day be decided by a reference, not to traditional usage, but to the principles of the Science of Education. The fact, then, that this science is not yet objectively constructed is no argument against our attempting to construct it, and we maintain that the pertinacious adherence to the notion of the all-sufficiency of routine forms the greatest difficulty in the way of securing the object. It is, however, mainly for the sake of the teachers of the next generation, that the importance of a true conception of the value of principles in education is insisted on.

It follows, then, that practical teachers who desire to see practice improved — and surely there is need of improvement — ought to admit that there is the same obligation resting on the educator to study the principles of his art as there is on the physician to study anatomy and therapeutics, and on the civil engineer to study mechanics. The art, in each of these cases, has a scientific basis, and the practitioner who desires to be successful in it — to be the master and not the slave of routine — must studiously investigate its fundamental principles.

But there is another argument against routine teaching which ought not to be omitted. It is founded on the effect which such teaching produces on the pupil. Those teachers who are themselves the slaves of routine make their pupils slaves also. Without intellectual freedom themselves, they cannot emancipate their pupils. The machine generates machines. They make their pupils mechanically apt and dexterous in processes, and in this way train them to practice; but not appreciating principles themselves, they cannot train them to principles. Yet this latter training, which essentially involves reasoning and thought, ought to be the continual and persistent aim of the educator. He has very imperfectly accomplished the end of his being if he dismisses his pupils as merely mechanical artisans, knowing the *how*, but ignorant of the *why;* expert in processes, but uninformed in principles; instructed, but not truly educated. It is the possession of principles which gives mental life, courage, and power: the courage which is not daunted where routine fails, the power which not only firmly directs the established machinery, but corrects its apparent eccentricities, can repair it when it is deranged, and adjust its forces to new emergencies. Take the case of a routine pupil to whom you propose an arithmetical problem. His first enquiry is, not what are the conditions of the question, and the principles involved in its solution, but what rule he is to work it by.* This is the question of a slave, who can do nothing without orders from his master. Well, you give him the rule. The rule is, in fact, a *résumé* of principles which some scientific man has deduced from concrete facts, and which represents and embodies the net result of various processes of his mind upon them. But what is it to our routine pupil? To him it is merely an order given by a slave driver, and he hears in it the words, — Do this; don't do that; don't ask why; do exactly as I bid you. He reads his rule, his order, does what he is bid, grinds away at his work, and arrives at the end of it as much a slave as ever, and he is a slave because his master has made him one.

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* MM. Demogeot and Montucci, in their Report to the French Government on English Secondary Instruction (Paris, 1867), severely comment on the mechanical spirit in which mathematics are generally taught in our schools through our taking little account of the reason, and making processes rather than principles the end of instruction (p. 120).

Educators, indeed, like other men, come under two large categories, which may be described in the pregnant words of the accomplished author of the "Autocrat of the Breakfast Table." "All economical and practical wisdom," he says, "is an extension or variation of the following arithmetical formula $2+2=4$. Every philosophical proposition has the more general character of the expression $a+b=c$. We are merely operatives, empirics, and egotists, until we begin to think in letters instead of figures."

Now the mere routine teacher belongs to the former, and the true educator to the latter class, and each will stamp his own image on his pupils.

All that has been said resolves itself, then, into the proposition that a man engaged in a profession, as distinguished from a mere handicraft, ought not only to know *what* he is doing, but *why;* the one constituting his practice, the other his theory. He cannot give a reason for the faith that is in him, unless he examines the grounds of that faith, — unless he examines them *per se*, and traces their connection with each other and with the whole body of truth. The possession of this higher kind of knowledge, the knowledge of principles and laws, is, strictly speaking, his only warrant for the pretension that he is a *professional* man, and not a mere mechanic. Society has not, indeed, hitherto demanded this professional equipment for the educator, nor has the educator himself generally recognized the obligation, aptly stated by Dr. Arnold, that, "in whatever it is our duty to act, those matters also it is our duty to study," and hence the present condition of education in England. Education can never take its proper rank among the learned professions, that proper rank being really the highest of them all, until teachers see that there really are principles of Education, and that it is their duty to study them.

But there is another mode of studying principles besides investigating them *per se.* They may be studied in the practice of those who have mastered them.

It is clear that a man may have carefully investigated the principles of an art, and yet fail in the application of them. This generally arises from his not having fully comprehended them. He has omitted to notice or appreciate something which, if he knew it, would answer his purpose; or from want of early training finds it difficult to deduce facts from principles, practice from theory. In such a case there is an available resource. Others have seen what he has failed to see, have firmly grasped what he has not comprehended, have made the necessary deductions, and embodied them in their own practice. Let the learner, then, in the Science of Education, study that practice, and trace it in the correspondence between the principles which he but partially appreciates, and their practical application in the methods of those who have thought them out. In other words, let him study the great masters of his art, and learn from them the philosophy which teaches by examples. This study, so far from being inconsistent with the Theory of Education, is, indeed, a necessary part of it. We may all learn something from the successful experience of others. De Quincy (as quoted by Mr. Quick in his valuable "Essays on Educational Reformers") has pointed out that a man who takes up any pursuit, without knowing what advances others have made in it, works at a great disadvantage. He does not apply his strength in the right direction, he troubles himself about small matters and neglects great, he falls into errors that have long since been exploded. To this Mr. Quick pertinently adds, — "I venture to think, therefore, that practical men, in education, as in most other things, may derive benefit from the knowledge of what has been already said and done by the leading men engaged in it both past and present." Notwithstanding the obvious common sense of this observation, it is undeniably true that the great majority of teachers are profoundly ignorant of the sayings and doings of the authorities in Education. Their own empirical methods, their own self-devised principles of instruction, generally form their entire equipment for their profession. I have myself questioned on this subject scores of middle-class teachers, and have not met with so many as half-a-dozen who knew anything more than the names, and often not these, of Quintilian, Ascham, Comenius, Locke, Pestalozzi, Jacotot, Arnold, and Herbert Spencer. What should we say of a physician who was entirely unacquainted with the researches of Hippocrates, Galen, Harvey, Sydenham, the Hunters, and Bright?

In the foregoing remarks I have endeavored to show that there 's, and must be, a Theory of Education underlying the practice however manifested, and to vindicate the conception of it from the contempt sometimes thoughtlessly thrown upon it by practical teachers.

But it is important now to attempt to ascertain what resources, in the shape of principles, hints, and suggestions, it furnishes to the educator in his three-fold capacity of director of Physical, Mental, and Moral education.

The conception we have formed of the educator in relation to his work requires him to be possessed of a knowledge of the being whom he has to control and guide. "Whatever questions," says Dr. Youmans, of New York, "of the proper subjects to be taught, their relative claims, or the true methods of teaching them, may arise, there is a prior and fundamental enquiry into the nature, capabilities, and requirements of the being to be taught. A knowledge of the being to be trained, as it is the basis of all intelligent culture, must be the first necessity of the teacher" (p. 404).*

Physical Education.

Viewed merely as an animal, this being is a depository of vital forces, which may be excited or depressed, well-directed or misdirected. These forces are resident in a complicated structure of limbs, senses, breathing, digesting and blood-circulating apparatus, &c.; and their healthy manifestation depends much (of course not altogether) upon circumstances under the control of the educator. If he understands the phenomena, he will modify the circumstances for the benefit of the child; if he does not understand them, the child will suffer from his ignorance. The daily experience of the school-room sufficiently illustrates this point. Place a large number of children in a small room with the windows shut down, and detain them at their lessons for two or three hours together. Then take note of what you see. The impure air, breathed and rebreathed over and over again, has lost its vitality—has become poisonous. It reacts on the blood, and this again on the brain. The teacher as well as the children all suffer from the same cause. He languidly delivers a lesson to pupils who more languidly receive it. They are no longer able to concentrate their attention. They answer his half-understood questions carelessly and incorrectly. Not appreciating the true state of the case, he treats them as wilfully indifferent, and punishes the offenders, as they feel, unjustly.

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* "The culture demanded by Modern Life: a series of addresses and arguments on the claims of scientific education. Edited by Dr. Youmans, New York, 1867." There is also an English edition, published by Macmillan.

They retain this impression; the cordial relation subsisting before is rudely disturbed, and his moral influence over them is impaired. We have here a natural series of causes and consequences. The state of the air, a physical cause, acts first on the bodies, then on the minds, and lastly on the hearts of the pupils; the last being, perhaps, the most important consequence of the three. Now in this case both teacher and pupils suffer from neglect of those laws of health which a knowledge of Physiology would have supplied. It is unnecessary to dwell upon the obvious applications of such knowledge to diet, sleep, cleanliness, clothing, &c.

Knowledge of this kind has been strangely overlooked in the educator's own education, though so much of his efficiency depends on his acting himself, and causing others to act, on the full recognition of its value. Education has too generally been regarded in its relations to the mind, and the co-operation of the body in the mind's action has been forgotten. Those who listened to the masterly lecture, delivered a few years ago at this College by Dr. Youmans, on the "Scientific Study of Human Nature," will remember his eloquent vindication of the claims of the body to that consideration which educators too frequently deny it, and the consequent importance to them of sound physiological knowledge. With singular force of reasoning he showed that the healthiness of the brain, as the organic seat of the mind, is the essential basis of the teacher's operations; that the efficiency of the brain depends in a great degree on the healthy condition of the stomach, lungs, heart and skin; and that this condition is very much affected by the teacher's application of the laws of health as founded on Physiology. His general remarks on education, and especially on physical education, are too valuable to be omitted: —

"The imminent question," he says (p. 406), "is, how may the child and youth be developed healthfully and vigorously, bodily, mentally, and morally? and science alone can answer it by a statement of the laws upon which that development depends. Ignorance of these laws must inevitably involve mismanagement. That there is a large amount of mental perversion and absolute stupidity, as well as bodily disease, produced in school, by measures which operate to the prejudice of the growing brain, is not to be doubted; that dullness, indocility, and viciousness, are frequently aggravated by teachers, incapable of discriminating between their mental and bodily causes, is also undeniable; while that teachers often miserably fail to improve their pupils, and then report the result of their own incompetency as *failures of nature*, — all may have seen, although it is now proved that the lowest imbeciles are not sunk beneath the possibility of elevation."

I give one short quotation from Dr. Andrew Combe, to the same effect. "I cannot," he says, "regard any teacher, or parent, as fully and conscientiously qualified for his duties, unless he has made himself acquainted with the nature and general laws of the animal economy, and with the direct relation in which these stand to the principles of education." Dr. Brigham also advices those who undertake to cultivate and discipline the mind, to acquaint themselves with Human Anatomy and Physiology.

All these authorities agree, then, that educators have a better chance of improving the physical condition of their pupils if they are themselves acquainted with the laws of health; and they insist, moreover, that the health of the body is not only desirable for its own sake, but because, from the interdependence of mind and body, the *mens sana* depends so much on the *corpus sanum.* This truth is strikingly, though paradoxically, expressed by Rousseau, when he says, "The weaker the body is, the more it commands; the stronger it is the better it obeys;" and when he also says, "make your pupil robust and healthy, in order to make him reasonable and wise."

In short, hundreds of writers have written on this subject for the benefit of educators, thousands of whom have never even heard of, much less read, their writings; or, if they have, pursue the even tenor of their way, doing just as they did before, and ignorantly laughing at Hygiene and all the aid she offers them.

Physical education also comprehends the training of special faculties and functions, with a view to improve their condition. The trainer of horses, dogs, singing birds, boxers, boat crews, and cricketers, all make a study, more or less profound, of the material they have to deal with — all except the educator, the trainer of trainers, who generally leaves things to take their chance, or assumes that the object will be sufficiently gained by the exercises of the playground and the gymnastic apparatus. It would be easy to show that this self-education, although most valuable, is insufficient, and ought to be supplemented by the appliances of Physiological Science. This science would suggest, in some cases, remedies for natural defects; in others, suitable training for natural weakness; in others, still graver reasons for checking the injurious tendency, so common amongst children, to over-exertion; and in all these cases would be directly ancillary to the professed object of the educator as a trainer of intellectual and moral forces.

The effect, too, of the condition of the mind on that of the body

— the converse reciprocal action — is an important part of this subject; but there is no time to enter on it.

Intellectual Education.

But let us next consider the relation of the educator to the *intellectual education* of his pupils. However willing he may be to repudiate his responsibility for the training of their bodies, he cannot deny his responsibility for the training of their minds. But here Dr. Youmans' words, already quoted, apply with especial force — "A knowledge of the being to be trained, as it is the basis of intelligent culture, must be the first necessity of the teacher," and few perhaps will venture to argue against those that follow: "Education," he says, "is an art, like locomotion, mining, and bleaching, which may be pursued empirically or rationally — as a blind habit, or under intelligent guidance: and the relations of science to it are precisely the same as to all the other arts — to ascertain their conditions, and give law to their processes. What it has done for navigation, telegraphy, and war, it will also do for culture."

The educator of the mind ought, then, to be acquainted with its phenomena and its natural operations; he ought to know what the mind does when it perceives, remembers, judges, &c., as well as the general laws which govern these processes. He sees these processes in action continually in his pupils, and has thus abundant opportunities for studying them objectively. He is conscious of them, too, in his own intellectual life, and there may study them subjectively; but the investigation, thus limited, is confessedly difficult, and will be much facilitated by his making an independent study of them as embodied in the science of Psychology or Mental Philosophy. This science deals with everything which belongs to the art which he is daily practising, will explain to him some matters which he has found difficult, will open his eyes to others which he has failed to see, will suggest to him the importance of truths which he has hitherto deemed valueless; and, in short, the mastery of it will endow him with a power of which he will constantly feel the influence in his practice. His pupils are continually engaged in observing outward objects, ascertaining their nature by analysis, comparing them together, classifying them, gaining mental conceptions of them, recalling these conceptions by memory, judging of their relations to each other, reasoning on these relations, imagining conceptions, inventing new combinations of them, generalizing by induction from particulars, verifying these generalizations by deduction to particulars, tracing effects to causes and causes to effects. Now, every one of these acts forms a part of the daily mental life of the pupils whom the educator is to train. Will not the educator, who understands them as a part of his science, be more competent to direct them to profitable action than one who merely recognizes them as a part of his empirical routine? Suppose that the object is to cultivate the power of observation. Now the power of observation may vary in accuracy from the careless glance which leaves scarcely any impression behind it, to the close penetrating scrutiny of the experienced observer, which leaves nothing unseen. Mr. J. S. Mill (Logic i. 408) has pointed out the difference between observers. "One man," he says, "from inattention, or attending only in the wrong place, overlooks half of what he sees; another sets down much more than he sees, confounding it with what he imagines, or with what he infers; another takes note of the *kind* of all the circumstances, but, being inexpert in estimating their *degree*, leaves the quantity of each vague and uncertain; another sees indeed the whole, but makes such awkward division of it into parts, throwing things into one mass which ought to be separated, and separating others which might more conveniently be considered as one, that the result is much the same, sometimes even worse, than if no analysis had been attempted at all. To point out," he proceeds, "what qualities of mind, or modes of mental culture, fit a man for being a good observer, is a question which belongs to *the theory of education*. There are rules of self-culture which render us capable of observing, as there are arts for strengthening the limbs."

But to return to our educator, who, having been educated himself in Mental Science, desires to make his pupils good observers. He recognizes the fact that, to make them observe accurately, he must first cultivate the senses concerned in observing; he must train the natural eye to see, that is, to perceive accurately — by no means an instinctive faculty; for this he must cultivate the power of attention; he must lead them to perceive the parts in the whole, the whole in the parts, of the object observed, calling on the analytical faculty for the first operation, the synthetical for the second; he must invite comparison with other like and unlike objects, for the detection of difference in the one case, and of similarity in the other, and so on. Is it probable that the teacher entirely ignorant of the science of Psychology, and the educator furnished with its resources, will make their respective pupils equally accurate observers?

It would not be difficult to show that a knowledge of Logic, as "the science of reasoning" or of the formal laws of thought should also be a part of the equipment of the accomplished educator. The power of reasoning is a natural endowment of his pupils; but the power of correct reasoning, like that of observing, requires training and cultivation. But we cannot dwell on this point.

In further illustration of the main argument, I beg to refer my hearers to the very ingenious lecture lately delivered at this College by my friend Mr. Lake, on "The Application of Mental Science to Teaching," and especially to teaching Writing, wherein he shows that even that mechanical art may be made a means of real mental training to the pupil. He proves that Muscular Sensibility, Sensation, Thought, Will, as well as the nascent sense of Artistic Taste, are all involved in the subjective process of the pupil; that in accordance with this, the educated educator frames the objective process, through which he develops the pupil's mind, and to some extent his moral character, and thus makes him a practical proficient in his art. Mr. Lake's lecture is probably the first attempt ever made to show the direct practical bearing of physiological and psychological knowledge on the art of teaching, and deserves the thoughtful consideration of all educators. This same Mental Science is also applicable to the teaching of Reading and Arithmetic. Indeed, I am persuaded — and I speak from some experience — that these elementary arts may be so taught as to become, not only "instruction," but true "education," to the child; not merely, as they are generally regarded, "instruments of education," but education itself. Observation, memory, judgment, reasoning, invention, and pleasurable associations with the art of learning, may all be cultivated by a judicious application of the principles of Mental Science. Mulhauser, and Manly (of the City of London School), have proved this for Writing, Jacotot for Reading, and Pestalozzi for Arithmetic. When this truth is acknowledged, it will be felt more generally than it is now, that the most pretentious schemes and curricula of education are, after all, comparatively valueless if they do not secure for the pupil the power of *doing common things well.* This, however, is a theme which would require a lecture by itself for its adequate treatment.

Moral Education.

But the child whom we have considered as the object of the educator's operations has moral as well as physical and intellectual faculties; and the development of these, with the view of forming character, is a transcendantly important part of the educator's work. This child has feelings, desires, a will and a conscience, which are to be developed and guided. Here, too, as in the other cases, Nature has given elementary teaching, and elicited desultory and instinctive action; but her lessons are insufficient, and require to be supplemented by the educator's.

The child, as already said, is a moral being, but his moral principles are crude and inconsistent. Acted on by the impulse of the moment, he follows out the promptings of his will, without any regard to personal or relative consequences; and if the will is naturally strong, even the experience of injurious consequences does not, of itself, restrain him. Self-love induces him to regard everything that he wishes to possess as rightfully his own. He says by his actions, "Creation's heir, the world — the world is mine." He is therefore indifferent to the rights of others, and resents all opposition to his self-seeking. He is also indifferent to the feelings of others, and often tyrannizes over those who are weaker than himself. His unbounded curiosity impels him incessantly to gain knowledge. He examines everything that interests him; acquires both ideas and expressions by listening to conversation; breaks his toys to see how they are made; displays also his constructive ability by cutting out boats and paper figures. But he has sympathy as well as curiosity. He makes friends, learns to love them, to yield up his own inclinations to theirs; imitates their sayings and doings, good and bad; adopts their notions, becomes like them. He has also a conscience, which, when awakened, decides, though in an uncertain manner, on the moral quality of his actions; and lastly he has a will, which is swayed by this self-love, curiosity, sympathy, and conscience.

This is a slight sketch of the moral forces which the educator has to control and direct. Now every teacher is conscious that he can, and does every day, by his personal character, by the economic arrangements of the school, by his general discipline, by special treatment of individual cases, exercise a considerable influence over these moral phenomena; and must confess that the extent of this influence is generally measured by his own knowledge of human nature, and that when he fails it is because he forgets or is ignorant of some elementary principle of that nature. If he allows this, he must allow that a larger acquaintance with the principles on which human beings act, — the motives which influence them, — the objects at which they commonly aim, — the passions, desires, characters, manners which appear in the world around him and in his own constitution, — would proportionately increase his influence.

But these are the very matters illustrated by the Science of Morals, or Moral Philosophy, and the educator will be greatly aided in his work by knowing its leading principles.

For what is the object of moral training? Is it not to give a wise direction to the moral powers, — to encourage virtuous inclinations, sentiments, and passions, and to repress those that are evil, — to cultivate habits of truthfulness, obedience, industry, temperance, prudence, and respect for the rights of others, with a view to the formation of character?

This enumeration of the objects of moral training presents a wide field of action for the educator; yet a single day's experience in any large school will probably supply the occasion for his dealing with every one of them. How important it is, then, that he should be well furnished with resources.

Every earnest educator, moreover, will confess that he has much to learn, especially in morals, from his pupils. To be successful, he must study his own character in theirs, as well as theirs in his own. Coleridge has well put this in these lines: —

"O'er wayward childhood would'st thou hold firm rule,
And sun thee in the light of happy faces?
Love, Hope, and Patience — these must be thy graces;
And in thine own heart let them first keep school."

A little story from Chaucer illustrates the same point. I give it in his own words: — "A philosopher, upon a tyme, that wolde have bete his disciple for his grete trespas, for which he was gretly amoeved, and brought a yerde to scourge the child; and whan the child saugh the yerde, he sayde to his maister, 'What thenke ye to do? 'I wolde bete the,' quod the maister, 'for thi correccioun.' 'Forsothe,' quod the child, 'ye oughte first correcte youresilf that han lost al youre pacience for the gilt of a child.' 'Forsothe,' quod the maister, al wepying, 'thou saist soth; have thou the yerde, my deere sone, and correcte me for myn impacience.'" This master was learning, we see, in the school of his own heart, and his pupil was his teacher.

Time does not allow of our entering more in detail into the question of moral training, and showing that the great object of moral, like that of physical and intellectual education, is to develop force, with a view to the pupil's *self-action*. Unless this point is gained — and it cannot be gained by preceptive teaching — little is gained. Our pupil's character is not to be one merely for holiday show, but for the daily duties of life — a character which will not be the sport of every wind of doctrine, but one in which virtue — moral strength, — is firmly embodied. Such a character can only be formed by making the child himself a co-operator in a process of formation.

If I have not specially referred to religious, as a part of moral education, it is because no truly religious educator can fail to make it a part of his system of means. As for the case of the teacher whose every-day life shows that he is not influenced himself by the religion which he, as a matter of form, imposes upon his pupils, I have great difficulty in conceiving of him as a teacher of morals at all.

I have now completed the general view I proposed to take of the relation of the educator to his work; and the gist of all that I have said is contained in the simple proposition, that he ought to know his business, if he wishes to accomplish his objects in the best way. The deductions from this proposition are, — that, as his business consists in training physical, mental, and moral forces, he ought to understand the nature of these forces, both in their statical and dynamical condition, at rest and in action, and should therefore study Physiology, Psychology, Ethics, and Logic, which explain and illustrate so many of the phenomena; * that he should, moreover, study them, as embodied in the practice of the great masters of the art. Inspired thus with a noble ideal of his work, he will gradually realize it in his practice, and become an accomplished educator. He will meet with many difficulties in this self-training, but the advantages he gains will more than compensate him. None can know better than himself — none so well — the trials, disappointments, fainting of heart, and defeats that his utmost skill cannot always turn into victories, which he will have to encounter; but then, on the other hand, few can know as he does those moments of wonderful happiness which fall to his lot when he sees his work going on well; when, in the improved health, the increased intellectual and moral power of his pupils, he recognizes the result of measures which he has devised, of principles

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* The late Mr. Fletcher, Inspector of Schools, thus enforces the same doctrine: — "The intellectual faculties can never be exercised thoroughly but by men of sound logical training, perfect in the art of teaching; hence there exist so few highly-gifted teachers. In fact, there are none but men of some genius who are said to have peculiar *tact*, which it is impossible to imitate: but I am anxious to see every part of the fine art of instruction redeemed from hopeless concealment under such a word, and made the subject of rational study and improved training."

which he has learnt from the school without, from the school within, and from the ripe experience and thought of the fellow-laborers of his craft. At such moments, fraught with the spirit of the great artist, who exclaimed in his enthusiasm, "Ed io anche sono pittore;" he also exclaims, "And I too am an educator!" This enthusiasm will be more common when educators entertain a more exalted conception of their profession.

That the educater cannot fully realize his conception, is no argument against his keeping it constantly in view, to stimulate his zeal and guide his practice. The eduation of aims and achievements must, after all, be an indeterminate one; but we approach nearer and nearer to its solution, by a high assumption for the aims. "We strive," as Coleridge says, "to ascend, and we ascend in our striving."

Nothing has been said of the value of Physiology, Psychology, &c., to the educator merely as a man, not as a professional man. But it is easy to see that it must be great. Nor have they been pointed out as subjects of direct instruction for his pupils; yet surely it is important that he should be able to give in his classes elementary lessons on all these subjects, particularly on Physiology. The nomenclature, at least, and the rudiments of Psychology may be advantageously learned by elder pupils, and the elements of Logic should certainly form a part of the instruction of students of Euclid and grammatical analysis.

But beyond the theoretical treatment of the Science of Education, I have a practical object in view. I wish to show that there is a strong presumption that the educator of our day needs education in his art. Individual teachers may deny this for themselves — they generally do — but they freely admit it with regard to their rivals in the next street, or the next town. Generalize this admission, and all we ask for is granted. But there is a test of a different kind which disposes of the question — the test of results. "By their fruits ye shall know them." If the fruit is good, the tree is good. If the large majority of schools are in a satisfactory condition, then the educator is doing his work well; for "as is the master, so is the school" — which means, to speak technically, that the results of a system of education are not as the capabilities of the pupil, nor as the external school machinery, but as the professional preparedness of the educator. If, then, the large majority of schools are unsatisfactory, it is because the teacher is unsatisfactory. And that they are so, is proved by every test that can be applied. All the Commissions on Education —

whether primary, secondary, or advanced — tell the same tale, pronounce the same verdict of failure; and that verdict would have been more decided had the judges been themselves educators. Dealing with a subject which they know mostly as amateurs, not as experts, they are not competent to estimate the results by a scientific standard; they therefore reckon as good much that is really bad; for the value of a result in education mainly depends on the manner in which it has been gained. Yet even these estimators severally declare that the educational machinery of this country is working immensely under the theoretical estimate of its power. The "scandalously small" results of the Public School education are paralleled or exceeded by those of the Middle Class and Primary Schools; and in cases of primary schools where this epithet would not apply, we find that the superiority is due to the preliminary training of the teacher.

What, again, is to be said of the evidence furnished by such a statement as the following, which we extract from the *Athenæum* of March 27, 1869: — "A petition was last week presented to the House of Commons from the Council of Medical Education, stating that the maintenance of a sufficient medical education is very difficult, owing to the defective education given in middle class schools. A similar complaint was made in a petition from the British Medical Association, numbering 4000 members. In a third petition, proceeding from the University of London, it was stated that during the last 10 years 40 per cent. [it has since been more than 50 per cent.] of the candidates at the Matriculation examinations have failed to satisfy the examiners."

Once more, Sir John Lefevre, describing, in 1861, the mental condition of the candidates for the Civil Service who came before him for examination, refers to "the incredible failures in orthography, the miserable writing, the ignorance of arithmetic. "It is comparatively rare," he says, "to find a candidate who can add correctly a moderately long column of figures." Some improvement has taken place, no doubt, during the last ten years under the influence of the examination of the College of Preceptors, and those of Oxford and Cambridge, but the main difficulty remains much the same.

This, then, is the evidence, or rather a part of the evidence which attests the unsatisfactory results of our middle class teaching. But we repeat, "as are the teachers, so are the schools;" and, therefore, without hesitation make the teachers directly responsible for these results. Had they been masters of their art, these results would have been impossible; and they are not masters of their art, because they have not studied its principles, nor been scientifically trained in its practice.

The true remedy has been suggested by many eminent men, not merely by teachers. It consists in teaching the teacher how to teach, in training the trainer, in educating the educator.

Thus, Dr. Gull, after complaining of the insufficient education of youths who are to study medicine, said (Evidence before Schools Enquiry Commission) that "improvement must begin with the teachers. Anyone is allowed to teach. There is no testing of the teacher. I think he should be examined as to his power of teaching and his knowledge." "The subjects (for his preparation) should include the training of the senses, and the intellect, and the teaching of the moral relations of man to himself and his neighbor."

Mr. Robson, in his evidence before the same Commission, said, "We should require certificates of teachers showing that knowledge has been attained, and also some knowledge of Mental Philosophy in connection with the art of teaching. Every teacher has to act on the human mind, and unless he knows the best methods of so acting, it is quite impossible he can exercise his powers to the best advantage." The evidence of Messrs. Howson, Besant, Goldwin Smith, Best, and others, was to the same effect.

The assistant Commissioners, Messrs. Bryce, Fearon, and especially Mr. Fitch, make the same complaints of the want of training for the teacher. Mr. Fitch — who has every right to be heard on such a point, for he thoroughly knows the subject, practically as well as theoretically — says, in his report on Yorkshire Endowed and Private Schools, "Nothing is more striking than the very general disregard on the part of schoolmasters of the Art and Science of Teaching. Few have any special preparation in it. Professional training for middle-class schoolmasters does not exist in this country. It is certain that many of them would gladly obtain it, if it were accessible. But at present it is not to be had." And again, "It is a truth very imperfectly recognized by teachers, that the education of a youth depends not only on what he learns, but on how he learns it, and that some power of the mind is being daily improved or injured by the methods which are adopted in teaching him." Mr. Fitch, in another place,* also remarks, "We all know instances of men who understand a subject thoroughly, and who are yet utterly incapable of teaching it. We have all seen that waste of power and loss of time continually result from the tentative, haphazard, and unskilful devices to which teachers of this kind resort. Yet we seem slow to admit the obvious inference from such experience. The art of teaching, like other arts, must be systematically acquired. The profession of a schoolmaster is one for which no man is duly qualified who has not studied it thoroughly, both in its principles and in their practical application."

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* "The Professional Training of Teachers": a paper read at the Bradford Meeting of the Association for promoting Social Science.

The Rev. Evan Daniel, principal of Battersea Normal School, aptly describes the two main classes of middle-class teachers. 1st. University men, "not infrequently of distinguished ability and scholarship. Few of them, however, have had the advantage of professional training. They enter on their work with but a slight knowledge of child-life; they have never studied the psychological principles on which education should be based; they are almost utterly ignorant of the best modes of teaching, of organizing, and of maintaining discipline." These are the teachers, rather the would-be teachers, who, as a distinguished Head Master told us some time ago in the *Times*, are to be allowed to find out their art by victimizing their pupils for two whole years before they become worth anything to their profession. But Mr. Daniel also refers to the other class of teachers, who, besides wanting everything that the former class want, also want their mental cultivation, and remain "in a state of intellectual stagnation, discharging their duties in a half-hearted perfunctory spirit, and finding them twice as hard and disagreeable as they need be, from the want of suitable preparation for them."

The arguments then from theory and those from facts meet at this point, and demand with united force that the educator shall be educated for his profession. But how is this to be brought about? What is doing in furtherance of this most important object? The answer to the question must be brief, and shows rather tentative efforts than accomplished facts.

1. The training of teachers for primary schools is going on satisfactorily in the Normal Colleges of the National and British and foreign School Societies, so that what is asked for middle-class teachers is evidently possible. They can be trained into better teachers than they are.

2. This training of the middle-class teachers, which some decry as quackery and others as useless, is actually going on in France and Germany most satisfactorily. In both countries, highly cultivated and efficient educators, with whom the majority of English

teachers would have no chance of competing, are the everyday product of their respective systems of training.

3. Our Government, in the Educational Council Bill, for the present withdrawn, provided "that all teachers of endowed schools should be registered, as persons whose qualifications for teaching have been ascertained by examinations, or by proved efficiency in teaching on evidence satisfactory to the Council;" and that teachers of private schools might also be entered on the registry, by showing similar qualifications.

4. The Scholastic Registration Association, having for its object "the discouragement of unqualified persons from assuming the office of schoolmaster or teacher," has obtained a large share of public approval, and numbers among its members many head-masters of public schools and colleges, as Drs. Hornby, Kennedy, Haig-Brown (President of the Association), Thring, Collis, Weymouth, Schmitz, Rigg, Donaldson, Jones, Mitchinson, the Revs. E. A. Abbott and F. W. Farrar, and many other distinguished friends of education.

5. The College of Preceptors, too, by the institution of this Lectureship, by the re-constitution of its Examinations for Teachers, and by its recent memorial to the Government on Training Colleges, is showing itself fully alive to the importance of the subject. Its new examinations have just taken place, and candidates have for the first time been examined on the principles of Physiology, Psychology, Moral Philosophy and Logic, and their application to the art of teaching, as well as on their own personal experience as educators. The results have shown how deeply needed is this knowledge of principles; out of fifteen candidates only three have satisfied the examiners. We still hope, however, by placing a high standard before the candidates, and requiring an earnest study of the subjects of examination, to make our diplomas certificates of real qualification, as far as written and *vivâ voce* examinations can test it.

Yet the real desideratum, after all, is Training Colleges for middle-class teachers, Professorships of Education at our leading Universities, and more, perhaps, than all, a nobler conception of education itself among English teachers.

In order to illustrate, to some extent, the bearing of scientific principles upon educational practice, the papers set at the recent Examination of Teachers at the College of Preceptors are appended. The primary questions, it will be seen, involve principles; the secondary, their application to practice.

COLLEGE OF PRECEPTORS.—EXAMINATION PAPERS.

June, 1871.

THEORY AND PRACTICE OF EDUCATION.

I. Physiology.

(*Third Class Candidates for the Associate's Diploma; having had one year's experience.*)

1. Give a *brief* general view of the functions of the body, and their relation to each other.

(*a.*) How would you apply this knowledge to Education? Show how it may be used in cases of inattention, obstinacy, sullenness, &c., as well as in those of physical weakness, indolence of constitution, &c.

2. Give some account of the process of Respiration and its connection with other functional processes, as well as of the results of its derangement.

(*a.*) What use would you make of your knowledge in teaching the art of Reading aloud?

(*b.*) Mention any defects of Vocalization common among children, and show how you would treat them.

3. Give a brief account of the structure of the Heart, and describe the Circulation of the Blood.

(*a.*) Is blushing under a charge of fault a necessary indication of guilt?

I. Physiology.

(*Second Class Candidates for the Licentiate's Diploma; having had two years' experience.*)

1. Describe generally the functions of the body.

(*a.*) What is the value of a knowledge of Physiology to the educator, with a view to promoting the health of his pupils? Give illustrations.

2. Describe Vesicular Nerve-substance. Distinguish the Cerebrum and the Cerebellum. Explain what is meant by "motor nerves" and "reflex action." What conditions are essential to Sensation?

(*a.*) Can you account for differences of intelligence in different individuals?

(*b.*) Describe any vicious processes of Education which produce unhealthy brain action; and classify the results.

3. How far does the health and mental power of a man depend on the quantity and quality of the air which passes through his lungs?

4. Explain briefly the connection between Physical, Intellectual, and Moral Education.

II. MENTAL AND MORAL SCIENCE.

(*Third Class.*)

1. Why is a classification of the acts of the mind into Memory, Judgment, &c., unsatisfactory?

2. What is meant by Attention? In what respects is it the groundwork of all mental education?

(*a.*) How would you cultivate Attention? how correct Inattention?

(*b.*) How far is Will necessary to Attention, and how would you gain the consent of the Will?

3. What are the characteristics of a good Memory? How would you cultivate Memory?

(*a.*) Distinguish between Rote-Memory and Rational Memory.

4. To what extent (if any) is corporal punishment a legitimate agent in education? How does it act? What are its effects on the moral sense? Compare it with other means of gaining the same end?

II. MENTAL AND MORAL SCIENCE, AND LOGIC.*

(*Second Class.*)

1. What is the relation between Mental and Moral Science?

2. Criticise the usual classification of mental acts, as Perception, Memory, &c.

3. What is Attention? How connected with other modes of intellectual actions?

(*a.*) How would you cultivate Attention?

(*b.*) To what extent is Attention connected with the Will? How would you gain the consent of the Will?

(*c.*) Is it easier to abstract the mind from touches or from sounds? Describe the probable effect on different temperaments of an organ playing a popular air while a lesson is going on. How would you act in the different cases?

4. What are the chief phenomena of Memory? How may Memory be cultivated?

(*a.*) Distinguish between a memory (1) for words, (2) for things, (3) for principles.

(*b.*) What is the connection of Memory with the "Association of ideas."

(*c.*) Describe and discuss different modes of learning Latin Grammar as applications of memory.

(*d.*) How would you cause a pupil to *unlearn?*

5. State and illustrate the law of the "Diffusion of Feeling." What are the doctrines opposed to this law?

(*a.*) Point out the mistakes, in cases of sullenness, sudden and violent passion, and obstinacy, into which an educator ignorant of this law is liable to fall.

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* Some of the logic questions are expected to be answered by every Candidate.

1. "Logic is the Science of the formal Laws of Thought." Explain and criticise this or any other definition of Logic with which you are acquainted.

(*a*.) Give some examples showing the application of Logic to Arithmetic and Grammar.

2. What is the essential difference between the propositions $2 + 1 = 3$, and $a + b = c$?

(*a*.) How may this principle be a guide to the order of teaching? Why not teach Algebra before Arithmetic?

3. Distinguish between Induction and Deduction.

(*a*.) What is the true relation between facts and principles? To what stages of mental development do these processes respectively belong?

(*b*.) Give some applications of Induction to (1) the teaching of Languages, (2) the teaching of Science.

4. What is a "connotative" term? What is meant by its "comprehension" and "extension"?

(*a*.) Take from English Grammar a connotative term, and show how you would give the idea of its comprehension and extension.

III. LESSON-GIVING, TREATMENT OF CASES, AND CRITICISM OF METHODS.

(*Second and Third Classes.*)

1. Write a sketch of a lesson in "Division of Decimals," stating (1) previous knowledge acquired; (2) the principles to which you would appeal; (3) the order you would adopt in development; (4) the exercises you would give, and the probable answers.

2. (*a*.) A is a child 11 years old, quick in apprehension, deficient in retentiveness, gentle in manners, indifferent to regulations.

(*b*.) B is 13 years old, quick, retentive, wilful, obstinate, pugnacious.

(*c*.) C is 14 years old, of moderate capacity, of indolent temperament, moody, thoughtful in subjects of his own choosing, indifferent in those proposed to him.

Give similarly two other cases. How would you treat each and all in (1) a small school (2) a large school of six classes?

3. Draw out a time table (30 hours per week), for boys leaving school at (1) 14 years of age, (2) 16 years of age, in Classics, Mathematics, History, Geography, English Grammar, French, Writing, giving reasons for the time you assign. Would you include any other subjects? if so, what, and why?

4. Mention any case of difficulty in (1) Teaching, (2) Discipline, which you have experienced. Describe the causes of your difficulty, state the course you adopted, and what principles of Physiology, Mental and Moral Science, you had in view in adopting such a course, and how far you were successful.

LECTURE II.*

THE PRACTICE OR ART OF EDUCATION.

The Theory of Education, as explained in the former Lecture, consists in an appreciation of the influences which must be brought to bear intentionally, consciously, and persistently on a child, with a view to instruct him in knowledge, develop his faculties, and train them to the formation of habits. It was shown that this view of Education assumes that the educator must himself study and comprehend the nature of these influences; and that this theoretical study, aided by the lessons of experience, both personal and that of others, constitutes his own education.

Assuming, then, the education of the educator himself, which involves a due conception of the end in view, we have now to consider some of the means by which he has to realize it, and this constitutes the Practice or Art of Education.

I have already disclaimed the idea of attempting to construct a symmetrical science of education, and am not bound therefore to deduce a symmetrical art from a theoretical ideal. Nor is this necessary; for whatever may be said of the Theory, there is no doubt that the Art of Education exists, and that its fundamental principles can be evolved from its practice.

The Art of Education, strictly considered, involves all the means by which the educator brings his influence to bear on his pupils, and embraces therefore organization, discipline, school economics, the regulation of studies, &c. Our limited space, however, forbids our entering on these matters, and the "Art of Education" will in this lecture be considered as only another term for Teaching or Instruction.

If we observe the process which we call instruction, we see two parties conjointly engaged — the learner and the teacher. The object of both is the same, but their relations to the work to be done are different. Inasmuch as the object can only be attained by the mental action of the learner, by his observing, remembering, &c., it is clear that what he does, not what the teacher does, is the essential part of the process. This essential part, the appropriation and assimilation of knowledge by the mind, can be performed by no one but the learner; for the teacher can no more think for his pupil, than he can walk, sleep, or digest for him. It is then on the exercise of the pupil's own mind that his acquisition of knowledge entirely depends, and this subjective process, performed entirely by himself, constitutes the pupil's art of learning. If, however, every act by which ideas from without become incorporated with the pupil's mind in an act which can only be performed by the pupil himself, it follows that he is in fact his own teacher, and we arrive at the general proposition, that *learning is self-teaching*. This psychological principle is of cardinal importance in the art of education. We see at once that it defines the function of the teacher, the other party in the process of instruction. It appears, from what has been just said, that the only *indispensable* part of the process — the mental act by which knowledge is acquired — is the pupil's, not the teacher's; and, indeed, that the teacher cannot, if he would, perform it for the pupil. On the other hand, the experience of mankind shows that the pupil, however capable, would not generally undertake his part spontaneously, nor, if he did, carry it to a successful issue. The indispensable part of the process cannot, it is true, be done without the mental exertion of the pupil, but it is equally true that it will not be done without the action and influence of the teacher. *The teacher's part then in the process of instruction is that of a guide, director, or superintendent of the operations by which the pupil teaches himself.*[*]

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* Delivered at the House of the Society of Arts, on 14th July, 1871; J. G. Fitch, Esq., in the chair.

As this view of the correlation of learning and teaching assumes the competency of the pupil to teach himself, it may of course be theoretically disputed. It is important then, to add that the child whom the teacher takes in hand has already learned or taught himself a great number of things. He has, in fact, learned the use of his senses, the qualities of matter, and the elements of his mother tongue, without the aid of any professed teacher. The faculties, however, by the use of which he has made these acquisitions, are the same that he must employ in his further acquisitions, when the action and influence of natural circumstances are superseded by those of the professed teacher.

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[*] "To teach boys how to instruct themselves — that, after all, is the great end of school-work." — MARKBY.

"The object of all education is to teach people to think for themselves." — "*University Extension*," an Address delivered at the request of the Leeds Ladies' Education Association, by James Stuart, Fellow and Assistant Tutor of Trinity College, Cambridge.

A slight review of the operation of these natural circumstances — which we may for convenience' sake call Nature — will serve to suggest some of the means by which the teacher, as a superintendent of the pupil's process of self-instruction, is to exercise his proper action and influence.

How, then, does nature teach? She furnishes knowledge by object-lessons, and she trains the active powers by making them act. She has given capability of action, and she develops this capability by presenting occasions for its exercise. She makes her pupil learn to do by doing, to live by living. She gives him no grammar of seeing, hearing, &c.; she gives no compendiums of abstract principles. She would stop his progress at the very threshold, if she did. Action! action! is her maxim of training; and things! things! are the objects of her lessons. She adopts much repetition in her teaching, in order that the difficulty may become easy, "use become a second nature." In physical training, "use legs and have legs," is one of her maxims, and she acts analogously, in regard to mental and moral training. She teaches quietly. She does not continually interrupt her pupil, even when he blunders, by outcries and objurgations. She bides her time, and by prompting him to continued action, and inducing him to think about what he is doing, and correct his errors himself, makes his very blunders fruitful in instruction. She does not anxiously intervene to prevent the consequences of his actions; she allows him to experience them, that he may learn prudence; sometimes even letting him burn his fingers, that he may gain at once a significant lesson in physics, and also learn the moral lesson involved in the ministry of pain.

These are some of the features of Nature's Art of Education, and they are all consistent with the assumption that throughout her course of instruction the pupil is teaching himself.

We infer, then, from these considerations, that the child whose instruction is to be secured by the guidance of the teacher has already shown his capacity to learn, and to learn, moreover, *without explanations*. We remark, further, that an accurate analysis of this process of self-tuition, based on the combined observations and experiments of teachers carefully noted and compared together, and generalized into principles of education, will, no doubt, in time to come, furnish the true canons of the art of teaching, or, in other words, that the pupil's subjective process of learning, when thoroughly understood, will suggest, with proper limitations, the teacher's counterpart objective process of teaching.

The principle I am contending for — that the child is capable of teaching himself without explanations — is indeed very generally acknowledged in word by teachers, who also very generally repudiate it in fact. They allow that it is not what they do for their pupil, but what he does for himself, that gives him strength and independent force: but the multitude of directions, precepts, warnings, exhortations, and explanations, with which they bewilder and enfeeble him, neutralizes their theoretical acknowledgment of the principle. Let such teachers say what they will, they virtually deny the pupil's native capacity; they act on the belief that he cannot learn without explanations, and especially without their explanations.

This question of the necessity of explanations is a vital point in our argument, and needs further discussion. Explaining is "flattening," or "making level," "clearing the ground" so as to produce an even surface; and, when applied to teaching, as generally understood, means removing obstructions out of the way, so as to make the subject clear to the pupil, and generally to do this by verbal discourse.

But (1), we notice that Nature, who makes her pupil teach himself, gives no explanations of this kind. She does not explain the difference between hard and soft objects — she says, feel them; between this and that fact — she says, place them side by side, and mark the difference yourself; and generally she says to her pupil, don't ask me to tell you any thing that you can find out for yourself.

(2) The question of explanations essentially involves those of the order of studies and the method of teaching. If the subject is unsuited to the pupil's stage of instruction, or if, instead of presenting him with facts which he can understand, we force upon him abstractions which he cannot, we create the need for explanations; and in this case it is not merely probable, but certain, that most of them, however elaborate, will be thrown away. We are, in fact, calling on the immature faculties for an effort which is beyond the strength of the trained intellect; for the man has never lived who can understand an abstract general proposition while utterly ignorant of the facts on which it is ultimately founded. But supposing that we admit the value of explanations generally, and that the explanations given are admirably clear in themselves, their value to the individual pupil will depend, not on

their absolute excellence, but on their relation to the condition of his mind. Unless, then, the teacher has well studied that mind, so as to know its individual history, its actual condition, and its needs, much of his explanation will "waste its sweetness on the desert air." That portion only will be received and assimilated for which the previous instruction has prepared the mind, and all the rest will flow away and leave no impression whatever behind it. And, in general, it may be laid down as a practical principle of teaching, that long elaborate explanations are entirely out of place in a class of children. They do not generally quicken, but rather quell, attention. The children, indeed, consider that, though it may be the teacher's duty to preach, it is no necessary part of theirs to heed the preaching. This work, as they generally take it, is the proper occasion for their play; and this play, without outward manifestation, may be going on uproariously in that inner playground where the teacher cannot set his foot. Rousseau, in his interesting if somewhat romantic "Emile," gives the following opinion on this subject — I adopt Mr. Quick's translation: — "I do not at all admire explanatory discourses; young people give little attention to them, and never retain them. Things! things! I can never enough repeat it, that we make words of too much consequence. With our prating modes of education, we make nothing but praters."

Now in these cases the teacher fails because he does not follow Nature. The pupils for whom he "clears the ground" would have cleared it themselves if he had known how to direct them, and would have been the stronger for the exercise.

Having thus indicated Nature's art of teaching, as, in a general way, the archetype of the educator's, it is important now to say that it is not to be implicitly followed.

(1.) *Nature's teaching is desultory.* She mingles lessons in physics, language, morality, all together. Her main business seems to be the training of faculty, and she subordinates to this the orderly acquisition of knowledge by her pupils. We are to imitate Nature in training faculty, but with a definite aim as regards subjects.

(2.) *Nature's teaching is often inaccurate*; not, however, from any defect in her *method*, but from inherited defects in her pupils. If she has not originally given a sound brain, she does not generally herself improve upon her handiwork. The impressions received by a feeble brain become blurred, imperfect conceptions, and Nature often leaves them so. It is the educator's business, however, to endeavor to improve upon her labors, — to ascertain the original fault, and by apt exercises to amend it.

(3.) *Nature's teaching often appears to be overdone.* She gives ten thousand exercises to develop faculty, but she continues to give them when that purpose is answered. The educator is to imitate her in very frequently repeating his lessons, but to cease when the object is gained.

(4.) *Nature does not secure the results of her lessons with a direct aim to mental and moral improvement.* She exercises various powers to a certain extent and with certain objects ; but she does not prompt to their improvement beyond this point, nor exercise them equally upon objects unconnected with animal wants and instincts. We are to imitate Nature in gaining such results for our pupils as she gains, but we are to go beyond her in securing these results as a means to the attainment of a higher platform of knowledge and power.

(5.) *Nature accustoms her pupils to little, and that the simplest, generalization.* For any care that she takes, the materials suitable for this process may remain unquickened throughout the whole of a man's life. The educator is to imitate Nature in prompting his pupils to generalize on facts, but to surpass her in carrying them forward in practice.

(6.) *Nature is relentless in her discipline.* She takes no account of extenuating circumstances. To disobey is to die. She not only punishes the offender for his offence, but often makes him suffer for the offences of others. She involves him in all the consequences of his actions, and often gives him no opportunity for repentance. The educator, on the other hand, while allowing his pupil to be visited by the consequences of his actions, is to prevent ruinous consequences — to give him room for repentance, to love the offender while punishing the offence, and to allow for extenuating circumstances.

Nature's teaching, then, while in general the model of the educator's, requires adaptation, extension, and correction, in order to make the best use of it. The old adage, "Art improves Nature," applies undoubtedly to the art of education, a truth which even Pestalozzi — certainly himself a choice specimen of Nature's teaching, a head boy in her school — failed, as we shall see, to appreciate.

The upshot of what has been said hitherto is this, that the natural process by which the mind acquires knowledge and power is a process of self-education, — that the educator should recognize that process as a guide to his practice, suggesting both what he should aim at and what he should avoid. To this it is very important to add, that his success in carrying out his object will greatly depend upon his being furnished with the resources of his science. A thousand unforeseen difficulties, arising from the individual personal characteristics of his pupils, will occur in the progress of his work, and demand the exercise of his utmost skill and moral courage for their treatment. It is here, quite as much as in the normal action of the machinery that he is directing, that the value of his own education as an educator will be found. It is the "unusual circumstances" referred to by Mr. Grove, that call for that "plasticity"—that multiform power of applying principles, which distinguishes the scientifically trained from the routine teacher.

I will now illustrate my subject by presenting two typical specimens of the Art of Teaching. In the first the teacher fully recognizes the competency of his pupils to learn or teach themselves without any explanations whatever from him, and, accordingly he gives them none; at the same time, however, he earnestly employs himself in directing the forces under his command, and sees in the self-instruction of his pupils, the result of his action and influence. In the second instance the teacher acts on the presumption that the pupil's success depends rather on what is done for him than on what he does for himself.

Suppose that the object be to give a lesson on a simple machine—say the pile-driving machine—in its least elaborate form. I scarcely need say that it consists of two strong uprights, well fastened into a solid, broad block of wood, as a basis, and supplied with two thick ropes, one on each side, which are laid over pulleys at the top of the uprights, and employed to draw up a heavy mass of iron, the fall of which on the head of the pile drives it into the earth. Two or three men at each rope supply the motive power.

Let a large working model of the machine be so placed that all the pupils of the class may see and have access to it. The teacher's object is to make this machine the means of communicating knowledge and of drawing forth their intellectual powers. He has no need to tell them to look at it. The image of it, as a whole, is at once impressed upon their minds. The teacher need not tax his ingenuity to devise methods for gaining their attention. Their attention is already on the full stretch. Their curiosity is largely excited—their eyes wide open, and "unsatisfied with seeing."—

"What can it be? What will it do?" He tells them the purpose of it, and nothing more, — "It is a contrivance for driving piles into the ground." They are eager to see it in action.

It is now at rest, the weight resting on the head of the pile. The teacher directs two of the children, one on each side, to lay hold of the ropes and pull up the weight, telling the class that the weight is called a *monkey* — a fact which they will certainly remember. [Names and conventionalities which they cannot find out for themselves, he must, of course, tell them; but telling of this kind is not explanation.] Well, the monkey is drawn up gradually, until the clutch relaxes its hold, and down it falls, to their immense delight. This is the first experiment. Let *all the children* try it — all pull up the weight with their own hands, and gain an idea, by personal, individual experience, of the resistance of the weight. This experience involves muscular sensibility, sensation, and a rudimentary notion of force. The children by this time, have an idea of the machine, and begin to conceive the relation between the end and the means — between the problem to be solved and the means of solving it. The pile evidently gives way under the repeated blows of the monkey. Let the monkey be weighed, and another substituted heavier or lighter. What is the result now? Use the measuring scale to see exactly how much the pile moves under the different weights. Why are the results different? [These mechanical acts of weighing and measuring exactly are not to be despised; they are fraught with practical instruction.] Next, let the height from which the weight falls be gradually varied, until there is *no height*, and the weight merely rests on the head of the pile, as at first. What is gained by the motion of the weight? Try the experiment many times — weigh, measure, judge. When is weight acting alone? — when along with motion? The children form a conception for themselves of *momentum;* and when the thing is understood the technical name may be given. Next, let the weight be detached and placed on an inclined plane — a slanting board. Why does it move now less easily than it did when it was free? Alter the inclination; try all the possible varieties of slope. When is the motion easiest? The pupils gain the idea of *friction*, and may have the name given them. Let the clutch be examined. How does it act? Why hold the weight so firmly at one moment and let it go the next? Try the experiment, handle it, attach it to the weight? Does it hold the weight *firmly?* Why does it let the weight go at the right moment? Again, suppose the weight were made of wood, lead, putty, &c., instead of iron.

Try these substances for the weight. Why are they less suitable for the purpose than iron?

Attach weights to the ropes, and see whether they may be so contrived as to supersede the manual labor. What are the difficulties in doing this? Can they be overcome? What is the use of the pulleys? Remove them, and pull at the ropes without them. What difference is there now in the ease of motion.

Could any one devise another machine for driving piles, or any other contrivance for doing the work of this better? Let every one think of this before the next lesson, and bring his model with him. The teacher sums up the results of the lesson, and tells the pupils to write them down before him. He examines their papers, and makes them correct the blunders themselves. The lesson is concluded.

Now in this lesson we have a typical specimen of the self-teaching of the pupils under the superintendence of the teacher. If teaching means, as stated in books on the subject, the communication of knowledge by the explanations of the teacher, he has taught them nothing. Of that kind of teaching which Mr. Wilson of Rugby calls "the most stupid and most didactic" — meaning that the most didactic is the most stupid — we have here not a trace. The teacher has recognized his true function as simply a director of the mental machinery which is, in fact, to do all the work itself; for it is not he, but his pupils, that have to learn, and to learn by the exercise of their own minds. He has constituted himself, therefore, as (if the expression may be pardoned) a sort of outside will and mind, to act on and co-operate with the wills and minds of his pupils. He is the *primum mobile* which sets the machinery in motion, and maintains and regulates the motion; but the work that it does, the results that it gains, are not his work nor his results, but the machinery's. In the case of the human machinery — the children's minds, which are not dead matter, but living organisms — he has had to supply motives to action, sympathy and encouragement — to apply, indeed all the resources of his science. But still he is simply the superintendent or director of the operations which constitute the learning or self-teaching of the pupils; and the intrusion of those explanations, which some consider the essence of teaching, would have hindered and frustrated the efficiency of those operations. For, in the case before us, why should he explain, and what has he to explain? The machine is its own interpreter. It answers those who interrogate it in the emphatic and eloquent language of facts — a language which the children understand without explanations; and it practises them abundantly in what Professor Huxley aptly calls the "logic of experiment;" and if it says nothing about abstractions and first principles, which they could not comprehend, it lays before them the proper groundwork for these mental deductions, ready for the superstructure of science when the proper time comes. And until this groundwork of facts is laid, the teacher may strain his mind and break his heart in his anxiety to give explanations. In fact, none that he can give will be equal in value to those given silently, powerfully, and effectually by the machine itself. It is clear, then, that nothing would be gained by his explanations, and that they are therefore unnecessary.

Without dwelling now on all the points of interest contained in the lesson that I have described, which will be summarized hereafter, I invite attention especially to two or three.

(1.) We notice the pleasurable feeling of the children thus actively engaged in the free exercise of their own powers — seeing, handling, experimenting, discovering, investigating, and inventing for themselves. This feeling will, by the necessary laws of association, always accompany the remembrance of the lesson. Is not this in itself an immense gain both for teacher and pupils?

But (2) there is another very important gain for the pupils thus educating themselves. It is an approved principle of the science of education that it should be the aim of the educator not merely to train faculty, but to induce in his pupils the power of exercising it without his aid — in other words, to make the pupils independent of the teacher. Now as, in the case before us, the children have gained their knowledge by the exercise of their own faculties — have observed, experimented, &c., for themselves, they cannot but have gained a rudimentary consciousness that they could, without the teacher, go through the same process in acquiring the knowledge of another machine. This consciousness of power, may, as I have said, be, at the end of the first lesson, merely rudimentary; but it will gain strength as they proceed, and the final result of such teaching will be that they will acquire the valuable habit of independent mental self-direction. An eminent French teacher used to be laughed at for saying that he was continually aiming to make himself *useless* to his pupils. The silly laughers thought that he had made a blunder, and meant to say — useful. But they were the blunderers.

(3.) It is a noticeable point in the process decribed that it led the children to discover, investigate, and invent on their own account. They were continually conscious of the pleasure of finding things out for themselves. They were continually making advances, however feeble, in the very path that the first discoverers of knowledge of the same kind, and indeed of every kind, had trod before them. Though only little children, they were unconsciously adopting the method of the scientific investigator, and becoming trained, though as yet but very imperfectly, in his spirit. Should they subsequently give themselves up to scientific inquiry, they will not change their method, for it is even now essentially that of scientific investigation. The value of this plan of learning is aptly pointed out in a well-known passage from Burke's essay on "The Sublime and Beautiful." "I am convinced," he says, "that the method of teaching [or learning] which approaches most nearly to the method of investigation is incomparably the best; since, not content with serving up a few barren and lifeless truths [such as abstractions, general propositions, formulæ, &c.], it leads to the stock on which they grew; it tends to set the reader [or learner] himself on the track of invention, and to direct him into those paths in which the author [or scientific investigator] has made his own discoveries." It is obvious that our children, engaged in investigating and dicovering for themselves, were precisely in the position, with regard to their subject, which is described in these words.

But their native inventive faculty was also exercised. They would be sure, before the next lesson, to take the hint given them by the teacher, and would be ready with various contrivances for modifying the pile-driving machine. When I say this I speak from experience, not conjecture. I have myself, when engaged in reading a simple narrative with a class of children, and meeting with a reference to some gate to be burst open by mechanical means, or some bridge to be extemporized in a difficult emergency, simply said, "try to invent a contrivance for accomplishing these objects, and show me to-morrow your notions by a drawing and description," and have never failed to receive a number of rude sketches of schemes more or less suited to the purpose, but all showing the intense interest excited by the devotion of their minds to the object. I am persuaded that teachers generally overlook half the powers latent in the minds of their pupils; they do not credit children with the possession of them, and therefore fail to call them out. An instructive instance of a different mode of proceeding is furnished by the experience of Professor Tyndall, when he was a teacher in Queenwood School. The quotation is rather long, but it is too valuable to be omitted. "One of the duties," he says, in his Lecture at the Royal Institution, On the Study of Physics as a branch of Education, "was the instruction of a class in mathematics, and I usually found that Euclid, and the ancient geometry generally, when addressed to the understanding, formed a very attractive study for youth. But [mark the *but!*] it was my habitual practice to withdraw the boys from the routine of the book, and to appeal to their self-power in the treatment of questions not comprehended in that routine. At first the change from the beaten track usually excited a little aversion; the youth felt like a child among strangers; but in no single instance have I found this aversion to continue. When utterly disheartened, I have encouraged the boy by that anecdote of Newton, where he attributes the difference between him and other men mainly to his own patience; or of Mirabeau, when he ordered his servant, who had stated something to be impossible, never to use that stupid word again. Thus cheered, he has returned to his task with a smile, which perhaps had something of doubt in it, but which nevertheless evinced a resolution to try again. I have seen the boy's eye brighten, and at length, with a pleasure of which the ecstacy of Archimedes was but a simple expansion, heard him exclaim, 'I have it, sir!' The consciousness of self-power thus awakened was of immense value; and animated by it, the progress of the class was truly astonishing. It was often my custom to give the boys their choice of pursuing their propositions in the book, or of trying their strength at others not found there. Never in a single instance have I known the book to be chosen. I was ever ready to assist when I deemed help needful, but my offers of assistance were habitually declined. The boys had tasted the sweets of intellectual conquest, and demanded victories of their own. I have seen their diagrams scratched on the walls, cut into the beams of the play-ground, and numberless other illustrations of the living interest they took in the subject. . . . The experiment was successful, and some of the most delightful hours of my existence have been spent in marking the vigorous and cheerful expansion of mental power when appealed to in the manner I have described." This is indeed a striking illustration of the true art of teaching, as consisting in the mental and moral direction of the pupils' self-education; and the result every one can see, was the acquisition of something far more valuable than the knowledge of geometry. They gained, as an acquisition for life, a knowledge of themselves, a consciousness of both mental and moral power, which all the didactic teaching in the world could never have given them. All teachers should learn, and practise, the lesson conveyed by such an example of teaching as this.

Now, taking the former instance as a typical specimen of the art of teaching, let us consider what is involved in it, and gather from it a confirmation of the views already given of the relation of the educator to his pupils, of the Science of Education to the Art.

We see (1) that the pupil, teaching himself under the direction of the educator, begins with tangible and concrete facts which he can comprehend, not with abstract principles which he cannot. He sees, handles, experiments upon the machine; observes what it is, what it does, draws his own conclusions; and thus healthfully exercise his senses, his powers of observation, his judgment; and prepares himself for understanding, at the proper time, general propositions founded on the knowledge that he has acquired.

(2.) That, in teaching himself — in gaining his knowledge — he employs a method, the analytical, which lies in his own power, not the synthetical, which would require the teacher's explanations, yet that he employs also the synthetical, when called on to exercise his combining and constructive faculty. He employs the analytical method in resolving the machine into its parts, its actions into their several constituents and means, and the synthetical when he uses the knowledge thus gained for interpreting other parts and other actions of the machine, and when he applies this knowledge to the invention of other contrivances not actually contemplated by the machine-maker.

(3.) That, in being made a discoverer and explorer on his own account, and not merely a passive recipient of the results of other people's discoveries, he not only gains mental power, but finds a pleasure in the discoveries made by himself, which he could not find in those made by others.

(4.) That in teaching himself, instead of being taught by the explanations of the teacher, he proceeds, and can only proceed, in exact proportion to his strength, gaining increased knowledge just at the time that he wants it — at the very moment when the increment will naturally become, to use a happy expression of Mr. Fitch, "incorporated with the organic life of his mind." It is needless to add, that he advances in this self-teaching, from the known to the unknown, for the process he employs leaves no other course open to him.

(5.) That, in teaching himself in this way, he learns to reason both on the relation of facts and the relation of ideas to each other: and that thus the "logic of experiment" leads him to the logic of thought.

(6.) That, in this process of self-teaching, he acquires a fund of knowledge and of mental conceptions, which, by the natural association of ideas, forms the groundwork or nucleus to which other knowledge and other conceptions of the same kind will subsequently attach themselves; the machine which he knows, becoming a sort of alphabet of mechanics, by means of which he will be able to read and understand, in some degree, other machines.

(7.) That the knowledge, thus gained by the action of his own mind, will be clear and accurate, as far as it goes, because it has been gained by his own powers. He may, indeed have to modify his first notions, to acknowledge to himself that his observations were imperfect, his conclusions hasty; but if not interfered with by unseasonable meddling from without, his mind will correct its own aberrations, and be much the stronger for being required to do this itself. (You will remember Professor Tyndall's experience in teaching geometry.)

(8.) That, by teaching himself in this special case, he is on the way to acquire the power of teaching himself generally, to gain the habit of mental self direction, of self power, the very end and consummation of the educator's art.

In order to illustrate my point still more clearly, by force of contrast, I will give a sketch of another mode of teaching, very commonly known in schools, taking the same subject for the lesson as before.

The teacher, whose operations we are now to observe, has a notion — a very common one — that as rules and general principles are compendious expressions representing many facts, he can economize time and labor by commencing with them. They are so pregnant and comprehensive, he thinks, that *if* (your *if* is a great peace-maker) he can but get his pupils to digest them, they will have gained much knowledge in a short time. This remarkable educational fallacy I have already referred to. Our teacher, however (not knowing the science of education, which refutes it), assumes its truth, takes up a book (a great mistake to begin with, to teach science from a book!), and in order to be quite in form (scientific form being the very opposite to this), reads out from it a definition of a machine: "A machine is an artificial work which serves to apply or regulate moving power;" or another to the same effect: "A machine is an instrument formed by two or three of the mechanical powers, in order to augment or regulate force or motion." Now the men who wrote these definitions were scientific men, already acquainted with the whole subject, and they summed up in these few words the net result of their observation of a great number of machines, so as logically to differentiate a machine from everything else. Their definitions were intended for the mature minds of students of science, and were therefore framed in a scientific manner. This logical arrangement is, however, the very opposite to that in which the science was historically developed, and which is the only one possible for the child who teaches himself. Our teacher, uninformed in the science of education which disposes of this and so many other questions belonging to the art, implicitly follows the good old way, and reads out, as I have said, the definition of a machine. The pupils, who are quite disposed to learn whatever really interests them, listen attentively, but not knowing anything about "moving power" or "force" nor what is meant by augmenting or regulating it, nor what "mechanical powers" are, at once perceive that this is a matter which does not concern them, and very sensibly turn their minds in another direction. The vivid curiosity and sympathy manifested in the other instance are wanting here. These pupils have no curiosity about the entirely unknown, and no sympathy with the teacher who presents them with the entirely unintelligible. The teacher perceives this, and endeavors to "clear the ground," evidently filled with stumbling-blocks and brambles, by an explanation: —"A machine," he says, (no machine being in sight) "is an artificial work, that is, a work made by art." (Boy, really anxious to learn something if he can, thinks, "What is art?" He has heard, perhaps, of the art of painting, but what has a machine to do with painting?) The teacher proceeds: "A machine you see [the children see nothing] is an artificial work (that is, a work made by art), which serves to apply, augment (that is add to) and regulate (that is, direct) moving force or power; you know what that is of course — [The teacher instinctively avoids explaining the mechanical *force* of a mere idea] — by combining or putting together two or more of the mechanical powers — that is, levers, pulleys, &c. —I need not explain these common words, everybody knows what they mean; — so now you see what a machine is. What is a machine?" A. B. answers, "A machine is a moving power." C. D., "It is something which adds force." "Adds force to what?" C. D. still, "to pulleys and levers." "How stupid you all are!" groans out the teacher, "there is no teaching you anything!" At that moment, E. F., a practical boy, gets a glimmering of the truth, and says, "A steam engine is a machine." This is an effort of the boy to dash through the entanglement of the words, and make his way up to the facts. The teacher, however, at once throws him back again into the meshes, by saying, "Well then, apply the definition." Boy replies, "I don't understand the definition." "Not understand the definition! Why, I have explained every word of it;" and so on. He reads the definition again, questions his pupils again upon it with the same result. He perceives that he has failed altogether in his object. All his explanations, which have been nothing more than explanations of *words*, not of *things*, (a very common error in teaching) have failed to "clear the ground," which remains as full of stumbling-blocks and brambles as ever. A bright thought strikes him. He introduces a picture of a machine — say of the pile-driving machine — (not the machine itself), and a considerable enlightenment of the darkness at once takes place. There is now something visible, if not tangible. Curiosity and sympathy are awakened, and some of the ends of teaching are secured, and more would be secured but that the teacher still confines himself to reading from his book a description of the machine, though he occasionally interpolates explanations of the technical words that occur. But the picture is, after all, a dead thing; all its parts are in repose or equilibrium; and the pupils, after giving their best attention to it, see in it scarcely any illustration of the terms of the definition through which they have labored so painfully. The pictured machine represents "moving power" by not moving at all, and "force" by doing nothing, while it leaves the "mechanical powers" an entirely unsolved mystery. They depart from the lesson with a number of confused notions of "moving power," "augmentation of force," "mechanical powers," "pile-driving," "monkeys," and "clutches," while the mental discipline they have acquired is an absolute nullity. Their minds have indeed never once been brought into direct vital contact with the matter they were to learn. The thing itself, the machine, has been withheld from them; nothing but a representation, possibly a misrepresentation, of it, has been seen, at a distance, in a state of dead repose. Instead, therefore, of observing themselves its *action*, they have been told what somebody else has observed; instead of trying experiments upon it with their own hands, they have been treated with a description of somebody else's experiments; instead of being required to form a judgment of their own on the relation of cause and effect, as seen in the action and reaction of forces, they have been made acquainted with the judgments of others, and the general result of the whole lesson probably is, that while they have been, no doubt, deeply impressed with the learning and science of their teacher (and especially of his book), they have left the class still more deeply impressed with the determination that, if this is science, they will have as little as possible to do with it.*

Now the teacher, in this case, may be credited with earnestness, zeal, industry, knowledge of his subject (though he had better have thrown away his book), with all the knowledge in short that goes to the making of a teacher, except (but the exception is rather important) a knowledge of the art of teaching.

These specimens of the art of teaching strikingly illustrate the principles before insisted on. It has been maintained that there is an inherent capacity in the child who has taught himself to speak and walk, to teach himself other things, provided that they are things of the same kind as he has learnt already. Now all children, not being born idiots, are capable of taking part in such a lesson as I have described—can employ their senses upon the concrete matter of the machine, observe its phenomena, make experiments themselves with it, and gain more or less knowledge by this active employment of their minds upon it. And the same would be true of lessons on other concrete matter—on flowers, stones, animals, &c. In fact, these children have been taught all their lives by contact with concrete matter in some shape or other, and the teacher who understands his science will see that there is no other possible path to the abstract. It is obvious, then, that rudimentary lessons on the properties of matter, in continuation of those already received from natural circumstances, should constitute the earliest instruction of a child; and our typical lesson conclusively shows that such instruction is attainable, and most valuable, not only for its own sake, but with a view to mental development.

It is also shown that when the subject of instruction is judiciously chosen, the pupil needs no verbal explanations. The lesson in question is a specimen of teaching in which, in accordance with the theory with which we set out, *all the work* on which the mental acquisition depends *is absolutely and solely done by the pupil*, while the *teacher's action and influence*, which originate and maintain the pupil's work, *is confined to guidance and superintendence.*

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* "There is no use, educationally, in telling you simply the results to which I have come. But the true method of education is to show you a road, by pursuing which you cannot help arriving at these results for yourselves." — "*University Extension*," *ubi supra*.

Many arguments might be adduced to show that the principle, that *the main business of the teacher is to get the pupil to teach himself*, lies at the basis of the entire art of Instruction. The teacher who, by whatever means, secures this object, is an efficient artist; he who fails in this point, fails altogether; and the various grades of efficiency are defined by the degree of approximation to this standard.*

The principle itself is recognized unconsciously in the practice of all the best teachers. Such teachers, while earnestly intent on the process by which their pupils are instructing themselves, generally say little during the lesson, and that little is usually confined to direction. Arnold scarcely ever gave an explanation; and if he did, it was given as a sort of reward for some special effort of his pupils; and his son, Mr. Matthew Arnold, tells us that such is the practice of the most eminent teachers of Germany.

If further authority for the theoretical argument be needed, it may be found in the words of Rousseau, who, recommending "self-teaching" (his own word), says,—"Obliged to learn by himself, the pupil makes use of his own reason, and not that of others. From the continual exercise of the pupil's own understanding will result a vigor of mind, like that which we give the body by labor and fatigue. Another advantage is, that we advance only in proportion to our strength. The mind, like the body, carries only that which it can carry. But when the understanding appropriates things before depositing them in the memory, whatever it afterwards draws from thence is properly its own." Again: "Another advantage, also resulting from this method, is, that we do not accustom ourselves to a servile submission to the authority of others; but, by exercising our reason, grow every day more ingenious in the discovery of the relations of things, in connecting our ideas, and in the contrivance of machines; whereas, by adopting those which are put into our hands our invention grows dull and indifferent, as the man who never dresses himself, but is served in everything by his servants, and drawn about everywhere by his horses, loses by degrees the activity and use of his limbs." ("Essays on Educational Reformers," p. 135.)

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* "All the best cultivation of a child's mind," says Dr. Temple, "is obtained by the child's own exertions, and the master's success may be measured by the degree in which he can bring his scholars to make such exertions absolutely without aid."

. . . "That divine and beautiful thing called teaching; that excellent power whereby we are enabled to help people to think for themselves; encouraging them to endeavors, by dexterously guiding those endeavors to success; turning them from their error just when, and no sooner than, their error has thrown a luminousness upon that which caused it; carefully leading them into typical difficulties, of which the very path we lead them by shall itself suggest the solution; sometimes gently leading them, sometimes leaving them to the resource of their own unaided endeavors; till, little by little, we have conducted them through a process in which it would be almost impossible for them to tell how much is their own discovery, how much is what they have been told."—"*University Extension,*" *ubi supra.*

These views of the fundamental principles involved in the Art of teaching, it will be seen, are not novel. The only novelty is in the mode of stating them. Practical teachers will candidly judge, by reference to their own experience, of their value and importance.

APPENDIX.

I.—ETYMOLOGY OF "LEARN" AND "TEACH."

A brief investigation into the original meaning of these words may be interesting to some readers, as throwing some light upon the theory of the text.

Learn (Old English, *lernen*) is a modification of the primitive English (or Anglo-Saxon) *leorn*-ian, which is itself a derivative of A.S. *lær*-an (Old English, *ler*-en), to teach. The relation between *lær*-an and *lern*-ian is indicated by the fact that in the Mœso-Gothic language, an elder sister of our own English, there was a class of verbs distinguished from certain simpler forms by an epenthetic *n*, which suggested a reflexive or passive meaning. Thus M.G. *luk*-an means to shut or lock up, but *lukn*-an, to lock oneself up, or be locked up; also *wak*-an, to wake another; *wakn*-an, to wake oneself, to be awake. We find traces of this usage in A.S. *eac*-an, to augment; *eacn*-ian, to augment oneself, be pregnant; *drenc*-an, to drench; *drencn*-ian, to drench oneself, be drenched, drown; *awæc*-an, to wake up another; *awæcn*-ian, to wake oneself up, be waked up; and therefore *lær*-an, to teach another; *leorn*-ian, to teach oneself—*i. e.* to learn.* As, however, the director of a work often gets the credit due to his subaltern, so the person who directed the pupil to learn was formerly said—and the usage still exists provincially—to *learn*, *lern*, or *larn* his pupil. Hence we find in Piers Plowman (v. 4756), "Who *lernede* thee on boke?" also, in Cranmer's version of the Psalms (Ps. cxix. 66), "O *learne* mee true understanding and knowledge;" and, in the "Tempest," Caliban says, "The red plague rid you for *learning* me your language," though he had, in the same sentence, said, "You *taught* me language."

But what does the original root *lær* mean? It is evidently equivalent to M.G. *lais*, *leis*, *les*, *s* being interchangeable with *r*, as in German *eisen* compared with *iron* (Old Eng., *iren*) and *hase* = *hare*. But M.G. *lais* or *les* is identical with German *les* in *les*-en, and signifies to gather together, acquire, glean, as in the provincial word *leasing*, gleaning or gathering up. The primitive meaning of the root A.S. *lær* = M.G., *lais*, *les*, though, as in *learn* = *teach*, the causative sense to make to gather, acquire, or learn must have been early superadded. On the whole, then, it appears that to *learn* is to gather up or glean for oneself, *i. e.*, to teach onsself.

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* See on these traces of a passive in ancient English, Rev. Oswald Cockayne's Notes, Nos. 43, 44, appended to his edition of "St. Marharete." (Early English Text Society.)

But the correlative *teach* must be briefly examined. The root appears as *teih*, in M.G. *teih*-en; *zeig*, in German *zeig*-en; *tæc*, in A.S. *tæc*-an; *dic*, *doc*, in Latin *dic*-ere, *di*(c)-scere, *doc*-ere; and in Greek δείκ-νυμι; and in all these cases means to *point out*, *show*; *direct*, *lead the way* — *i. e.*, teach. Thus *dic*-ere means to show *in words*, to say; *doc*-ere, to show *the way*; *di*(c)*scere*, to show oneself the way, to learn. The same idea is conveyed by the French equivalents *montrer* and *enseigner*, both meaning to teach.*

The etymology, then, of both *learn* and *teach* supports, by the instinctive genius of language, the theory that learning is gathering up or gleaning for oneself, and teaching the guiding, directing, and superintending of the process.

II. — ON BOTANY AS A STUDY SUITED TO TRAIN THE OBSERVING POWERS OF CHILDREN.

Since the foregoing Lecture was delivered, I have met with a work which remarkably illustrates the principles on which I have insisted. It is entitled "The First Book of Botany, Designed to Cultivate the observing Powers of Children. By Eliza A. Youmans. (New York: Appleton & Co.; London: Appleton & Co., Little Britain, 1871.)" The method pursued is one by which the pupil teaches himself, by exercising his mind — unaided by the explanations of the teacher — on the flowers, leaves, and objects generally of the vegetable world. It is, therefore, a practical illustration of the principle that "the main business of the teacher is to get the pupil to teach himself," and this little book admirably shows how it may be carried out. In selecting Botany as a subject fitted for this purpose, by the abundance of materials that it furnishes, and by the simplicity of its elementary facts, the author has manifested a wise discretion. Nor is her method a merely theoretical scheme; it is based on practical experience. The object she considers so desirable she has herself accomplished, and her work shows how other teachers may accomplish it also. I cannot do better than present, in the words of the preface, the purpose of the book.

(1.) It lays the foundation for a knowledge of Botany in the only true way, by providing for the actual and regular study of plants themselves. This practice is *enforced* by the plan of the book.

(2.) It provides for a systematic training in the art of observation. The book simply *guides* the pupil, but he must work his own way — examining, searching, comparing, judging, and describing the objects as he finds them.

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* A curious instance of the use of the word *teach* has been pointed out by Mr. Farrar, who quotes Judges viii. 6: — "Gideon took thorns of the wilderness and briars, and with these he *taught* the men of Succoth." Gideon's plan of teaching is hardly yet obsolete.

(3.) This plan first supplies the long-recognized deficiency of object-teaching, by reducing it to a method and connecting it with an established branch of school-study. Instead of desultory practice in noting the disconnected properties of casual objects, the exercises are made systematic, and the pupil is trained not only to observe the sensible facts, but constantly to put them in those relations of thought by which they become organized knowledge.

The objects here described are strictly carried out, and we thus have, for the first time, a realization of the idea of Dr. Whewell, who, insisting on the value, as a mental discipline, of the exact and solid study of some portion of inductive knowledge, as botany, geology, or chemistry, proceeds, — "But I say the exact and solid knowledge; not a mere verbal knowledge, but a knowledge which is real in its character, though it may be elementary and limited in its extent. The knowledge of which I speak must be a knowledge of things, — an acquaintance with the operations and productions of Nature as they appear to the eye, not merely an acquaintance with what has been said about them, — a knowledge of the laws of Nature seen in special experiments and observations, before they are conceived in general terms, — a knowledge of the types of natural forms, gathered from individual cases already familiar. By such study of one or more departments of inductive knowledge, the mind may escape from the thraldom and illusion which reigns in the world of mere words."

These weighty words aptly point out the importance of bringing the mind of the pupil into actual contact with facts and phenomena, as illustrated both in the elementary lesson in mechanics given in the Lecture, and in the systematic lessons in botany contained in Miss Youmans' book.

In view of the supreme importance of such a training as is here suggested for children of all classes, Miss Youmans suggests the introduction of botany into the curriculum of primary instruction, as "*a fourth fundamental branch of study* (*i. e.*, in addition to reading, writing, and arithmetic) *which shall afford a systematic training of the observing powers*" — a suggestion well worth the attention of all teachers who desire to supersede the senseless drill of routine by the processes of intellectual education.

LECTURE III.

EDUCATIONAL METHODS.

THERE is a just distinction between a Method and an Art, and between these and a Science. A Method is a special mode of administering an Art, and an Art is a practical display of a Science. In education, every teacher must have some mode of exhibiting the notions he has of his art, and this mode is his Method. He is practising his Art whenever he calls forth the active powers of his pupils, let the subject on which he exercises them be what it may. A simple machine, a flower, a bit of chalk, or a portion of language, may be the means for displaying his art. But if he contents himself with leading his pupils, in a desultory way, from one point of knowledge to another, from one temporary mental excitement to another, he risks their loss both of instruction and education — the one consisting in the orderly acquisition of knowledge; the other in the attainment, through instruction, of good mental habits. The teacher, then, must define his object by a special mode or method for securing it. This method will be the exponent of his notions of the Art of Education, and will be good or bad just as these notions are sound or unsound; and this, again, will depend on his knowledge of the Science of Education — a science, as was before shown, ultimately based on that of Human Nature.

The principle being once admitted, that the instruction aimed at can only be gained by the thinking of the pupil, it follows that the direct object of the teacher is to get the learner to think. The mode of procedure which secures this object in the best way is the best method of teaching. There may, therefore, be many good methods of teaching; but no method is good which does not recognize and appreciate the pupil's natural method of learning. This principle, I repeat, serves as the test of the method employed by the teacher; and it is in this sense that the pupil's subjective process of learning suggests the objective counterpart method of teaching. If the teacher succeeds in getting his pupils to do all the thinking by which the instruction is gained, the method he employs must be a good one; for, to repeat Dr. Temple's words already quoted, "the master's success may be measured by the degree in which he can bring his pupil's to make such exertions [*i.e.*, the exertions of their own minds] absolutely without aid." In the system of agencies, then, by which the work of instruction is to be accomplished, the principle, that the pupil's own mental effort alone secures the intended result, is the centripetal force which is ever tending to harmonize the details of the process. Continually acting in opposition to this are the centrifugal forces — volatility, indolence, indifference, &c., which tend to disturb its normal operation. The teacher who commands both these forces, directing the centripetal and controlling the centrifugal, is a master of educational method, and preserves unity of action amidst the endless diversities of his practice.

It follows from the foregoing observations, that as the characteristics of a good method of teaching are suggested and dictated by the characteristics of a good method of learning, it is important to know what is involved in a good method of learning. In the last Lecture, I endeavored to show, by an illustrative lesson, what the pupil, under the direction of the teacher, does when engaged in teaching himself a machine. The lesson was, however, presented as typical, and may be applied, *mutatis mutandis*, to other subjects of instruction. It showed that a child can learn the elements of physical science by the exercise of his own mind, "absolutely without the aid" of the teacher, except that aid which consists in maintaining the mental force by which the pupil acquires his knowledge. The teacher throughout recognized the native capacity of his pupils to learn, and his method consisted in stimulating that capacity to do its proper work. He gave no explanations, because the machine being its own interpreter, none were needed. He gave no definitions, because all definitions, given in anticipation of the facts on which they are founded, would have been unintelligible; and he properly considered that the true basis of all science is a knowledge of facts. He recognized, in short, throughout the entire lesson, the principle which I have so often insisted on, that his pupils were teaching themselves, and that he was the director of the process.

In order to show what the method of the pupil was, it is necessary briefly to recapitulate the main points of the process. We notice, then —

1. That he began his self-teaching with tangible and concrete matter, on which he could exercise his natural senses.
2. That he employed analysis in gaining his knowledge, and synthesis in displaying and applying it.
3. That he was an explorer, experimenter, and inventor on his own account — a true, however feeble, disciple of the method of scientific investigation.
4. That he proceeded in proportion to his strength, and consequently from the known to the unknown.
5. That the ideas that he gained, being derived by himself from facts present to his senses, were clear and accurate as far as they went.
6. That by teaching himself — relying on his own powers — in a special case, he was acquiring the power of teaching himself generally; and was therefore on the way to gain the habit of independent mental self-direction — the real goal of all the teacher's efforts.

7. That he dispensed with all explanations on the part of the teacher, though he was told the conventional and technical names for things which he already knew.

These are not all, but they are the main, characteristics of the pupil's method of learning elementary science, and indeed of learning everything — language, geometry, arithmetic, for instance — which admits of analysis or decomposition into parts, or which ultimately rests on concrete matter. In learning the imitative arts, the process will be somewhat varied, but the principles remain essentially the same; for it is the same human mind engaged in teaching itself under the direction of the teacher.

All the main characteristics, then, of a good method of teaching are involved in those of the pupil's natural method of learning, that is to say, the teacher must begin his instructions in science, language, &c., with concrete matter — with facts; must exercise his pupil's native powers of observation, judgment, and reasoning; call on him to practise analysis and synthesis; make him explore, investigate, and discover for himself; and so on.

Now it is obvious that, in order to maintain that action and influence by which the pupil's method is to end in complete and accurate knowledge, the teacher must be well furnished with that knowledge of mental and moral phenomena — of human nature, in short — which, as I showed in the first Lecture, should constitute his own equipment as an educator. He must know what the mind does while thinking, in order to get his pupils to think correctly. He must also know the normal action of moral forces before he can effectually control the moral forces of his pupils. In short, he must know what education is, and what it can be expected to accomplish, before he can make it yield its best results. Without this knowledge, much of his labor may be misapplied, and, even if not altogether wasted, will be much less productive than it would otherwise have been.

In order to show that these notions respecting the characteristics of a good method are not merely theoretical, I will now quote from an independent source — Mr. Marcel's valuable treatise on Teaching* — what he considers to be the main features of such a method generally.

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* "Language as a means of Mental Culture and International Communication; a Manual of the Teacher and the Learner of Languages." By C. Marcel, Knt. Leg. Hon: French Consul; 2 vols. 12mo; Chapman & Hall, 1853 — a work of conspicuous excellence on the whole art of teaching, and well deserving to be reprinted.

First, says Mr. Marcel, "*A good method favors self-teaching;*" and on this point he makes the following apt remarks: —

"One of the chief characteristics of a good method consists in enabling learners to dispense with the assistance of a teacher when they are capable of self-government. It should be so contrived as to excite and direct their spontaneous efforts, and lead them to the conviction that they have the power, if they have the will, to acquire whatever man has acquired. The prevailing notion that we must be taught everything [that is, by "the most stupid and most didactic method"] is a great evil. . . . The best informed teachers and the most elaborate methods of instruction can impart nothing to the passive and inert mind. If even a learner succeeded in retaining and applying the facts enumerated to him, the mental acquisition would then be vastly inferior to that which the investigation of a single fact, the analysis of a single combination [*e. g.*, the fact of the pile-driving machine, the combinations it afforded], by his unaided reason, would achieve."

2. "*A good method is in accordance with nature.*"

He adds, — "The natural process by which the vernacular idiom is acquired demonstrates what can be done by self-instruction, and presents the best model for our imitation in devising a method of learning languages." [This is only another way of stating the main proposition, that the method of teaching is suggested by the natural method of learning.]

3. "*A good method comprises Analysis and Synthesis.*"

"Analysis, the method of Nature, presents a whole, subdivides it into its parts, and from particulars infers a general truth. By analysis we discover, truths; by synthesis we transmit them to others. . . . Analysis, consistently with the generation of ideas and the process of nature, makes the learner pass from the known to the unknown; it leaves him by inductive reasoning to the object of study, and is both interesting and improving, as it keeps the mind actively engaged. Synthesis [Mr. Marcel here means the synthetic process of the teacher; there is a little confusion in his statement], on the contrary, which imposes truths, and sets out with abstractions, presents little interest, and few means of mental activity in the first stages of instruction. . . . It is, however, necessary for completing the work commenced by analysis. In a rational method we should follow the natural course of mental investigation; we should proceed from facts to principles, and then from principles down to consequences. We should begin with analysis, and conclude with synthesis. . . . In the study of the arts, decomposition and recomposition, classification and generalization, are the groundwork of creation [*i. e.* of invention]."

4. "*A good method is both practical and comparative.*"

Mr. Marcel, who has in view especially the learning of language, means, that there should be both practice founded on imitation, and comparison, conducted by the exercise of the reasoning powers. "The former," he says, "exercises the powers of perception, imitation, and analogy; the latter those of reflection, conception, comparison, and reasoning; the first leads to the art, the second to the science, of language. . . . The one teaches how to use a language, the other how to use the higher faculties of the mind. The combination of both would constitute the most efficient system." [It is needless to say that our model lesson on teaching elementary science presented both these characteristics.]

5. "*A good method is an instrument of intellectual culture.*"

This is little more than a repetition of the previous statements. However, Mr. Marcel, in insisting that a good method should cultivate all the intellectual faculties, further remarks, that "through such a method the reasoning powers will be unfolded by comparing, generalizing, and classifying the facts of language, by inferring and applying the rules of grammar, as also by discriminating between different sentiments, different styles, different writers and different languages; whilst the active co-operation of attention and memory will be involved in the action of all the other faculties.

Such are, according to Mr. Marcel, who only represents all the writers of any authority on the subject, the main criteria of a good method of teaching. It is obvious that, though he has chiefly in view the teaching of languages, they strikingly coincide with the deductions we gathered from observing the pupil's own method of learning elementary science. The conclusion, then, appears inevitable, that the characteristics of a good method must be the same, whatever the subject of instruction, and that its goodness must be tested by its recognition or non-recognition of the natural laws of the process by which the human mind acquires knowledge for itself.

Having thus indicated the main criteria of a good method of teaching, I shall employ the remainder of our time in the exposition and criticism of the methods of a few of the masters of the art.

I begin with Roger Ascham's method of teaching Latin, a method characterized by Mr. J. B. Mayor (himself a high authority on education), in his recently published valuable edition of "The Scholemaster," as "the only sound method of acquiring a dead language."

Ascham gave his pupils a little dose of grammar to begin with. He required them to learn by heart about a page of matter containing a synopsis of the eight parts of speech, and the three concords. This was the grammatical equipment for their work. He then took an easy epistle of Cicero. What he did with it may be best learned from his own words. "First," he said, "let the master teach the childe, cherefullie and plainlie, the cause and matter of the letter [that is, what it is about], then let him construe it into Englishe, so oft, as the childe may easilie carie awaie the understanding of it. Lastlie, parse it over perfitlie. [The teacher, it is seen, supplies conventional knowledge — the English words corresponding to the Latin — which the child could not possibly find out for himself, and strictly applies the modicum of grammar already learned.] This done thus, let the childe, by and by, both construe and parse it over againe; so that it may appeare, that the childe douteth in nothing that his master taught him before. [This is the reproductive part of the process, involving a partial, mechanical, synthesis.] After this, the childe must take a paper booke, and, sitting in some place where no man shall prompe him, by himself, let him translate into Englishe his former lesson. [This is a test of sound acquisition, and involves a more definite synthesis.] Then showing it [his translation] to his master, let the master take from his Latin booke, and pausing an houre, at the least, than let the childe translate his owne Englishe into Latin againe, in an other paper booke. [This is the critical test, the exact reproduction by memory, aided by judgment, of the knowledge gained by observation and comparison.] When the childe bringeth it turned into Latin [his re-translation] the master must compare it with Tullies booke [the Latin text of the epistle], and laie them both togither; and where the childe doth well, either in chosing or true placing of Tullies words, let the master praise him, and saie, Here ye do well. For I assure you there is no such whetstone to sharpen a good witte and encourage a will to learninge, as is praise." [This last part of the process is especially valuable, involving the correction of faults in the presence of the model, the pupil being really taught, not by the arbitrary dictum of the master, but by the superior authority of the master's master, the author himself.]

In this way, supplying additional grammatical knowledge by the law of exigence, just when it is needed, the teacher finds in the text thus carefully "lessoned," studied, and known by the pupil, "the ground," as Ascham puts it, "of almost all the rewles that are so busilie (anxiously) taught by the master, and so hardlie learned by the scholer, in all common scholes; which after this sort the master shall teach without all error [because founded on facts present to view], and the scholer shall learn withoute great paine; the master being led by so sure a guide, and the scholer being brought into so plaine and easie a waie. And, therefore," he proceeds, "we do not contemne rewles, but we gladlie teach rewles; and teach them more plainlie, sensibile, and orderlie than they be commonlie taught in common scholes."

We see in Ascham's method, that the concrete preceded the abstract; the particulars, the generalization; the examples of language, the grammatical rules. He was thus carrying out the spirit of Dean Colet and Cardinal Wolsey, who had insisted, to use the words of the former, that if a man desires "to attain to understand Latin books, and to speak and to write clean Latin, let him above all busily (carefully) learn and read good Latin authors of chosen poets and orators, and note wisely how they wrote and spake, and study always to follow them, desiring none other rules but their examples." After much more to the same effect, he ends his instructions to the masters of St. Paul's School, by urging that "busy (careful) imitation with tongue and pen more availeth shortly to get the true eloquent speech, than all the traditions, rules, and precepts of masters." Cardinal Wolsey uses nearly the same words in his directions to the masters of Ipswich School.

Into the further details of Ascham's method, so quaintly described in the "Scholemaster," I cannot enter, except to say that after a long training in double-translations, with the constant application of grammar rules as they are wanted ("the grammar booke being ever in the scholer's hand, and also used by him, as a dictionarie, for everie present use,") the master translates himself easy portions of Cicero into English, and then requires the pupil, *who has not seen the original*, to turn them into Latin. The pupil's work is then to be carefully compared with, and corrected by, the original, "for of good heedtaking springeth chiefly knowledge." This exercise prepares the scholar for independent composition in Latin.

There is one feature especially in this method, as described by Ascham, worthy of careful notice, and that is the *close study of a small portion of literary matter, ending in a complete mastery of it.* The various exercises of the method require the pupil, as Ascham shows, to go over this portion at least a dozen times; and he adds significantly, "always with pleasure; for pleasure allureth love, love hath lust to labor, labor always attaineth his purpose." By continually coming into direct contact with the phraseology of the text, the pupil masters the form, and through the form penetrates into the spirit of the author; or, as Ascham phrases it, "by marking dailie and following diligentlie the footsteps of the best authors, the pupil understands their invention of arguments, their arrangement of topics, and hereby," he adds, "your scholar shall be brought not only to like [similar] eloquence, but also to all true understanding and rightful judgment for speaking and writing." It appears, then, that Ascham's pupil proceeds firmly on a broad basis of facts, which he has made his own by mental conquest, and that this has been possible because the field of conquest has been intentionally limited. It is obvious that no method of teaching which consists in bringing a bit of this thing (or author), a bit of that thing (or author), transiently before the pupil's mind, creating ideas, like dissolving views, each of which in its turn displaces its predecessor, which makes acquisitions only to abandon them before they are "incorporated with the organic life of the mind," can possibly be a good method. Hence the very general result of our systems of education, so called, is a farrago of facts partially hatched into principles, mingled in unseemly jumble with rules half understood, exceptions claiming equal rank with the rules, definitions dislocated from the objects they define, and technicalities which clog rather than facilitate, as they should do, the operations of the mind.

It would be easy to show that the valuable ends of instruction and education can only be gained by *doing a little well;* that the ambition to grasp many things ignobly ends in the loss of the large majority of them (*qui trop embrasse mal étreint*); that apprehension is not comprehension, and generally, that to the characteristics of a good method of teaching we must add this, that it aims at securing *multum*, but not *multa.* If the object of education is training to faculty, to mental self-direction, his principle must be constantly insisted on. I see, however, with the deepest regret, that our educational amateurs — men of the best intentions, but of no practical experience — are continually violating it in their persistent attempts to extend the curriculum of elementary instruction. A little bit of this knowledge, a little bit of that — some information on this point, and some on that — is so "useful." They forget that the most useful thing of all is the formation of good mental habits, and that these *can* only be formed by concentrating the mind on a few subjects, and making them the basis of training. When this supremely useful object has been gained, the curriculum may be extended *ad libitum;* but not till then. What is really wanted in primary, and indeed all classes of schools, is not so much, more subjects to teach, but the power of teaching the ordinary subjects well. Ascham's method, then, with some slight modifications, presents all the characteristic features of a good method of teaching, and is, I need not point out, identical in principle with that already illustrated. It is natural, simple, effective, although so widely different, in most of its features, from the traditional methods of our grammar schools; which are indeed, in most respects, suited to the mental condition of the ambitious, active-minded, inventive few, but not at all to the ordinary mental condition of the many. We too often forget that the *raison d'être* of the schoolmaster is the instruction, not of the *minority* who *will* and can teach themselves, but of the *majority* who can but *will* not. Our teaching force should regulate the movements rather of the ordinary planets than of the *comets* of the system.

In the seventeenth century, a number of thoughtful men — Germans — unsatisfied with the methods of education then in vogue, began almost simultaneously to investigate the principles of education; and, as the result, arrived virtually at the conclusion on which I have so often insisted, that the teacher's function is really defined by that of the pupil, and that it is by understanding what he is, and what he does, that we learn how to treat him wisely and effectively. The eminent names of Ratich, Sturm, and especially Comenius, are connected with this movement. I can do no more than refer those who are interested in the details to Von Raumer's valuable "Geschichte der Pädagogik," or to Mr. Quick's exposition of them in the "Essays on Educational Reformers." The results may be stated in Mr. Quick's words:

"1. They (the reformers in question) proceed from the concrete to the abstract, giving some knowledge of the thing itself before the rules which refer to it. 2. They employ the student in analyzing matter put before him, rather than in working synthetically according to precept. 3. They require the student *to teach himself, under the superintendence of the master*, rather than be taught by the master, and receive anything on the master's authority. 4. They rely on the interest excited in the pupil by the acquisition of knowledge; and renounce coercion. 5. Only that which is understood may be committed to memory."

The methods, then, of these reformers present the same characteristics which we have deductively gained by other means.

In a lecture on Methods, it is impossible to omit the names of Locke and Rousseau. As, however, it is easy to read through the short and very interesting "Treatise of Education" and the capital digest of the "Emile" in Mr. Quick's book, I may pass them over.

We come next to Pestalozzi — a name of world-wide renown, of still increasing influence. He differed essentially from Comenius, whom he practically succeeded in the history of education, in being a comparatively uneducated man. When once reproached by his enemies (of whom, from various causes, he had many) with being unable to read, write, and cipher respectably, he frankly acknowledged that the charge was true. On another occasion he confessed to an "unrivalled incapacity to govern" — a confession which discovered a most accurate self-knowledge on his part; and generally, his whole educational life bore witness to the deficiency of his mental equipment and training. He often bitterly deplored, when he could not remedy, this ignorance and incapacity. His mind, however, was remarkably active and enterprising, and his moral power truly immense. A thousand criticisms on his want of knowledge, of judgment, of the power of government, of even common sense (as men usually estimate that quality), fall powerless as attacks on a man whose unfailing hope, love, and patience not only formed his inward support under trials and disappointments, but combined with that intense necessity of action, which was the essence of his nature, in stamping his moral influence on all around him. Virtue, with him, was not a mere word; it was an energetic, ever-acting force.* To instruct and humanize the poor wretched children. who were generally his pupils, — to relieve their physical wants and sufferings, — to sympathize with them under their difficulties, — was to him not only a duty but a delight. To accomplish these objects, he worked like a horse (only harder), fagging and slaving sometimes from three in the morning till eleven at night, dressed himself like a mechanic, almost starved himself, became, as he tells us, "the children's teacher, trainer, paymaster, man-servant, and almost house-maid;" and all this to gain the means for instructing, boarding, sometimes even clothing, children who not unfrequently rewarded his labors with ingratitude and scorn. Pestalozzi was indeed the Howard of schoolmasters.

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* Like most enthusiasts, however, he exercised it very irregularly. On one occasion, we are told, when reduced to the utmost extremity for want of money, he borrowed 400 francs from a friend. Going home, he met a peasant wringing his hands in despair for the loss of his cow. Without a moment's hesitation, Pestalozzi put the purse with all its contents into the man's hands and ran off, as quick as he could, to escape his thanks.

It was his unbounded philanthropy that first led him to become a schoolmaster, — his intense love and pity that supplied both motive and means. He saw around him children perishing, as he conceived, for lack of knowledge; and though possessed of little himself, though mentally untrained, though ignorant of the experience of other teachers, he resolved, with such appliances as he had, to commence the work. The one ruling thought in his mind was, "Here are poor ignorant children. From my heart I pity them. I feel that I can do them some good. Let me try."

It is not to be wondered at that his trials often proved "trials" indeed, and ended in utter disappointment: for although his educational instincts furnished him with excellent notions and theories about teaching, the actual results were often unsatisfactory. In this intense eagerness to press forward, he never stopped to examine results, nor to co-ordinate means with ends. Provided that he could excite, as he generally did, a vivid interest in the actual lesson, he was contented with that excitement as the end of his teaching. Thus, while he, to some extent, developed the mental powers, he did not even conceive of the higher end of training them to independent action.

In order to show what Pestalozzi's method of teaching really was, I shall quote some passages from an interesting narrative written by Ramsauer, who was first a pupil and then a teacher in one of Pestalozzi's schools.*

Referring to his experience as a pupil, he says, "I got about as much regular schooling as the other scholars — namely, none at all; but his (Pestalozzi's) sacred zeal, his devoted love, which caused him to be entirely unmindful of himself, his serious and depressed state of mind, which struck even the children, made the deepest impression on me, and knit my childlike and grateful heart to his for ever."

Pestalozzi had a notion "that all the instruction of the school should start from form, number, and language; so that the entire curriculum consisted of drawing, ciphering, and exercises in language." "We neither read nor wrote," says Ramsauer, "nor were we required to commit to memory, anything secular or sacred."

"For the drawing, we had neither copies to draw from nor directions what to draw, but only crayons and boards; and we were told to draw 'what we liked.' . . . But we did not know what to draw, and so it happened that some drew men and women, some houses, &c. . . . Pestalozzi never looked to see what we had drawn, or rather scribbled; but the clothes of all the scholars, especially the sleeves and elbows, gave unmistakable evidence that they had been making due use of their crayons." [This is a remarkable specimen of children being left to teach themselves, *without the careful superintendence of the teacher*, and certainly does not recommend the practice.]

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* Those quotations are taken from a translation by Mr. Tilleard of Von Raumer's account of Pestalozzi's Life and System, given in the "Geschichte der Pädagogik."

"For the ciphering," Ramsauer says, "we had between every two scholars a small table pasted on mill-board, on which, in quadrangular fields, were marked dots which we had to count, to add together, to subtract, to multiply and divide, by one another." [Here there is obviously some superintendence; the character of it, however, is seen in what follows.] "But as Pestalozzi only allowed the scholars to go over and to repeat the exercises in their turns, and never questioned them nor set them tasks, these exercises which were otherwise very good, remained without any great utility. He had not sufficient patience to allow things to be gone over again, or to put questions; and in his enormous zeal for the instruction of the whole school, he seemed not to concern himself in the slightest degree for the individual scholar." [These are Ramsauer's words, and they give a curious idea of a superintendence which involved neither knowledge of the nature of the machine, nor a true conception of the end towards which it was working, nor any notion of the corrections necessary to control its aberrations and apply its action to special cases. Yet, as making concrete matter the basis of the abstractions of number, it was good; and good, too, in employing the pupil's own observation, and his analytical and synthetical faculties. Hence we find that Pestalozzi was more successful in teaching arithmetic than anything else.]

Ramsauer proceeds, — "The best things we had with him were the exercises on language, at least those which he gave us on the paper-hangings of the school-room, and which were real exercises on observation." "These hangings," he goes on to say, "were very old and a good deal torn; and before these we had frequently to stand for two or three hours together, and say what we observed in respect to the form, number, position, and color of the figures painted on them, and the holes torn in them, and to express what we observed in sentences gradually increasing in length. On such occasions he would say, 'Boys, what do you see?' (He never named the girls). *Ans.* — A hole in the wainscot (meaning the hangings). *P.* — Very good. Now repeat after me: I see a hole in the wainscot. I see a long hole in the wainscot. Through the hole I see the wall. Through the long narrow hole I see the wall. *P.* — Repeat after me: I see figures on the paper-hangings. I see black figures on the paper-hangings. I see round black figures on the paper-hangings. I see a square yellow figure on the paper-hangings. Beside the square yellow figure I see black round figures, &c.

"Of less utility were those exercises in language which he took from natural history, and in which we had to repeat after him, and at the same time to draw, as I have already mentioned. He would say: — Amphibious animals — crawling amphibious animals, creeping amphibious animals. Monkeys — long-tailed monkeys, short-tailed monkeys, — and so on."

Ramsauer adds, — "We did not understand a word of this, for not a word was explained; and it was all spoken in such a sing-song tone, and so rapidly and indistinctly, that it would have been a wonder if any one had understood anything of it, and had learned anything from it. Besides, Pestalozzi cried out so dreadfully loud and so continuously that he could not hear us repeat after him, the less so as he never waited for us when he had read out a sentence, but went on without intermission, and read off a whole page at once. Our repetition consisted for the most part in saying the last word or syllable of each phrase; thus, "Monkeys — monkeys," or "Keys — keys." There was never any questioning or recapitulation."

This long but interesting account, from the pen of an attached pupil, fairly represents (as we learn from Von Raumer himself, who spent nearly nine months in the school) Pestalozzi's actual teaching, though not the ideal which, in describing results to strangers, he often, in his enthusiasm, substituted for it.

In criticizing it, we observe, in the first place, that Pestalozzi's method excites mental action to some extent, but secures the ends neither of instruction nor education. It scarcely at all recognizes the self-teaching of the child, but rather supersedes it by the mechanical repetition of the master's words. The observation of the child, called for a moment to the properties of objects, is immediately checked by the resolution, on the part of the teacher, of the lesson on things into a lesson on words. The *naming* of qualities, not ascertained by investigation, but pointed out by the teacher, constitutes what Pestalozzi looked on in theory as a training of the powers of *observation*. Von Raumer, Professors Malden and Mosely, and Herbert Spencer, all agree in their estimate both of the value of Pestalozzi's theory respecting object-teaching, and the comparative worthlessness of his practice. In fact, to hold up a piece of chalk before a class (keeping it in your own hands all the while), to call out "That is chalk," and to make the class repeat after you three times, "That is chalk! that is chalk! that is chalk!" or "Chalk is white," "Chalk is hard," &c., is in no proper sense teaching the properties of chalk, but only the names of its properties. Pestalozzi, however, never saw this, nor that his method generally had no tendency to train the mind. An additional proof of his blindness in this respect was that he drew up manuals of instruction for his teachers which involved in their use a perfectly slavish routine. Thus we learn from his "Book for Mothers," that the teacher, in teaching a child the parts of his own body (which he fancied was the subject to be first taught), is to go, word for word, through a quantity of such matter as this: — "The middle bones of the index finger are placed outside, on the middle joints of the index finger, between the back and middle members of the index finger," &c. Then he compiled a spelling-book containing long lists of words, which were to be repeated to the infant *in its cradle*, before it was able to pronounce even one of them, that they might be deeply impressed on its memory by frequent repetition.

On the whole, then, from Pestalozzi's method *pur et simple*, there is little to be gained. It was much improved subsequently by some of his teachers, Schmid, Niederer, &c., who saw in his theories applications which he failed to see himself. Had he been educated in education, — had he, moreover, profited by the experience of others, — had he brought his practice into conformity with his principles (crude enough though some of these were) — his career, instead of being a series of failures and disappointments, many of them due, however, to his unrivalled "incapacity to govern," would have been one of triumphant success.

As it is, we owe him much. His principles, and much of his practice, are an inheritance that the world will not willingly let die. Let us, however, leave the noble-minded, self-sacrificing Pestalozzi, with all his virtues and all his faults, and pass on to Jacotot.

It should be stated in the outset, that Jacotot was rather an educator of the mind than of all the human forces. He does not appear to have been placed in circumstances which required him to develop and train, by special treatment, the physical and moral powers; although the moral force of his own energetic character, as well as that of his system, could not but be, and was, vitally influential on the whole being of his pupils. It is, however, mainly as a teacher that I propose to consider him.

But some here will enquire who was Jacotot; — a question I have no time to answer in detail. I can merely say that he was born at Dijon in 1770; was educated at the college of that town; at nineteen years of age took the degree of Docteur-ès-Lettres, and was appointed Professor of Humanities (*i. e.*, grammar, rhetoric, and composition) in the same college; when the troubles of his country arose, became, at the age of twenty-two, a captain of artillery, and fought bravely at the sieges of Maestricht and Valenciennes; was afterwards made sub-director of the Polytechnic School at Paris; then Professor of the Method of Sciences at Dijon; and later Professor of Pure and Transcendental Mathematics, Roman Law, Ancient and Oriental Languages in different colleges and universities. Obliged, as a marked opponent of the Bourbons, to leave France on their restoration, he took refuge in Brussels, and was in 1818 appointed by the Belgian government Professor of the French Language and Literature in the University of Louvain; there discovered the method of teaching which goes by his name; devoted the remainder of his life to propagating it; and died at Paris in 1840, being then seventy years of age.

We are told that, as a schoolboy, he displayed some remarkable characteristics. He was what teachers, and especially dull ones, consider a particularly "objectionable" child. He was one of those children who "wanted to know, you know," why this thing was so; why that other thing was not. He showed little deference, I am afraid, to the formal didactic prelections of his teachers. Not that he was idle; far from that. We are told that he delighted in the acquisition of all kinds of knowledge that could be gained by his own efforts, while he steadily resisted what was imposed on him by authority; admitting nothing which was *primâ facie* contestable; rejecting whatever he could not see clearly; refusing to learn by heart grammars, or, indeed, any mere digests of conclusions made by others. At the same time he eagerly committed to memory passages of authors which pleased him, thus spontaneously preferring the society of the "masters of the grammarians" to that of the grammarians themselves. Even as a child, nearly everything he knew he had taught himself. He was, in short, ill adapted to be a pupil of any of those methods which, in Mrs. Pipchin's fashion, are intended to open the mind of a child like an oyster, instead of encouraging it to develop like a flower. As a Professor, his rooms were always crowded with eager pupils; and his inaugural address, at Louvain, was received, we are told by one who was present, with an enthusiasm like that which usually greeted Talma on the stage.

His style of teaching, as a Professor, before the invention of his method, was striking and original. Instead of pouring forth a flood of information on the subject under attention from his own ample stores, explaining everything, and thus too frequently superseding, in a great degree, the pupil's own investigation of it, Jacotot, after a simple statement of the object of the lesson, with its leading divisions, boldly started it as a quarry for the class to hunt down, and invited every member to take part in the chase. All were at liberty to raise questions, make objections, and suggest answers, to ask for facts as the basis of arguments, to repudiate mere didactic authority. During the discussion, the teacher confined himself to asking questions, to suggesting now and then a fresh scent, to requiring clear statements and mutual courtesy; but of teaching, in the popular sense of the term, as consisting in the authoritative communication of knowledge, there was little or none. His object throughout was to excite, maintain, and direct the intellectual energies of his pupils — to train them to think. The lesson was concluded by his summing up the arguments that had been adduced, and stating clearly the results obtained.*

We come now to the origin of Jacotot's method. In entering on his duties at Louvain, he found that he had to lecture to students, many of whom knew nothing of French. As he was himself ignorant of Flemish, the problem was how to teach them. He solved it in this way. He put into their hands copies of Télémaque, which contained a Flemish translation, not literal, on the opposite page. After some exercises in pronunciation, he directed the students, through an interpreter, to commit to memory a few sentences of the French text, and gather their general meaning from the version in their own language. They were told, on the second day, and for several days, to add other portions in the same way, while carefully repeating from the beginning. This process, the laying in of materials, was repeated until a page or two of the book was thoroughly known — that is, known so that the pupils could go on with any sentence of the French text from memory, when the first word was given, or quote the whole sentence in which any given word occurred, while they had at the same time a general idea of the meaning. The teacher now began, through his interpreter, to put questions, in order to test their knowledge, not only of the sentences, as wholes, but also of the component phrases and words. As the process of learning by heart, and repeating from the beginning, went on, the questions became more close and specific, so as to induce in the pupils' minds an analysis of the text into its minutest elements. When about half the first book of Télémaque was thus intimately known, Jacotot told them to relate in their own French, good or bad, the substance, not the exact words, of this or that paragraph of the portion that they knew, or to read a paragraph of another part of the book, and write down or say what it was about. He was surprised at their success in this synthetic use of their fund of materials. He praised their achievements; saw, but took no notice of, the blunders; or if he did, it was simply to require the pupils to correct them themselves by reference to the text (just as Ascham did). He reckoned on the power of the process itself, which involved an active exercise of the mind, to correct blunders which arose from inadvertence. In a very short time, these youths, learning, repeating, answering questions, were able to relate anything that they had first read over. Compositions of different kinds, their text furnishing both subjects and language, were then given, and it was found that as they advanced they spontaneously recognized in their practice the rules of orthography and grammar (without having learned them), and at length wrote a language not their own better (as Jacotot somewhat extravagantly declared) — that is with a more complete command of the force, correctness, and even grace of style — than either himself or any of his colleagues.

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* Mr. Wilson of Rugby, in his admirable paper in the "Essays on a Liberal Education," thus describes, in almost identical terms, what he considers a proper method of teaching science: —

"Theory and experience alike convince me that the master who is teaching a class quite unfamiliar with scientific method, ought to make his class teach themselves, by thinking out the subject of the lecture with them, taking up their suggestions and illustrations, criticizing them, hunting them down, and proving a suggestion barren or an illustration inapt; starting them on a fresh scent when they are at fault, reminding them of some familiar fact they had overlooked, and so eliciting out of the chaos of vague notions that are afloat on the matter in hand — be it the laws of motion, the evaporation of water, or the origin of the drift — something of order, and concatenation, and interest, before the key to the mystery is given, even if, after all, it has to be given. Training to think, not to be a mechanic or surveyor, must be first and foremost as his object. So valuable are the subjects intrinsically, and such excellent models do they provide, that the most stupid and didactic teaching will not be useless, but it will not be the same source of power that "the method of investigation" will be in the hands of a good master. Some few will work out a logic of proof, and a logic of discovery, when the facts and laws that are discovered and proved have had time to lie and crystallize in their minds. But imbued with scientific method they scarcely will be, unless it springs up spontaneously in them." — "On Teaching Natural Science in Schools." *Essays on a Liberal Education*, pp. 281, 282.

All were surprised at the result of his experiment, but Jacotot alone perceived the principles involved in it. He saw —

(1.) That his pupils had learned French, not through his knowledge of it—the circumstances forbade that — but through the exercise of their own minds upon the matter of the text, which they had committed to memory. If they had had any teacher, the book had been their teacher. It was from that source they had derived all their knowledge, and the exercise of their observing, remembering, comparing, generalizing, judging, and analyzing powers upon it had supplied them with the materials they employed in their synthetic applications.

(2.) He saw that, though he had been nominally their teacher, they had really taught themselves,— that the acquisitions they had made were their own acquisitions, the fruit of their own mental exertions, — that the method by which they had learned was really their method, not his.

(3.) He deduced from this observation, that the function of the teacher is that of an external moral force, always in operation to excite, maintain and direct the mental action of the pupils, —to encourage and sympathize with his efforts, but never to supersede them.

After awhile Jacotot presented, in the form given below, the result of his meditations on the principles involved in his experiments. This precept for the guidance of the teacher, is in fact — as will be at once seen — an epitome of the method of the learner, and indeed of all learners, whatever be their age, or the subject they may wish to learn so as really to know.

This, then, is the fundamental precept of Jacotot's method: — *Il faut apprendre quelque chose, et y rapporter tout le reste ; i. e.*, the pupil must learn something, and refer all the rest to it. When further explanation was demanded, he would reply to this effect: —

(1) *Learn* — *i. e.*, learn so as to know thoroughly, perfectly, immovably (*imperturbablement*), as well six months or twelve months hence as now — something, a portion of a book, for instance. (2) *Repeat* that something, the portion learned, incessantly — *i. e.*, every day or very frequently (*sans cesse*), from the beginning, without any omission, so that no part of it be forgotten. (3) *Reflect* upon the matter thus acquired — analyze it, decompose it, re-combine the elements, make it a real mental possession in all its details, interpret the unknown by it. (4) *Verify*

— test general remarks — *i. e.*, grammatical and other rules — by comparing them with the facts — the phraseology and constructions which you already know. In brief, *learn*, *repeat*, *reflect*, *verify*, or if you like, *learn*, *verify*, *repeat*, *reflect;* so that you *learn* first, the order of the other processes is unimportant. Know facts, then; bring all the powers of the mind to bear upon them; and repeat what you know, to prevent its being lost. This is the method of Jacotot, which may be otherwise represented thus: —

In all your learning, do homage to the authority of facts.

(1) *Apprenez.* — Learn them accurately; grasp them firmly; apprehend, so as to know them.

(2) *Rapportez.* — Compare them with each other, interpret one by another, make the known explain the unknown, generalize them, classify them, analyze them into their elements, re-combine the elements, attach new knowledge to the pegs already fixed in your mind.

(3) *Répétez.* — Don't let the facts slip away from you. To lose them, is to waste the labor you spent in acquiring them. Keep them, therefore, continually before you by repetition.

Vérifiez. — Test general principles, said to be founded on them by confronting them with your facts. Bring your grammatical rules to the facts, and explain the facts by them.

In all this process, the pupil is employing natural means for a natural end. He is doing what he did in the case of the pile-driving machine — observing, comparing, investigating, discovering, inventing; and if we apply the tests — Mr. Marcel's or any other — of a good method, we find them all in this, which is the method of the pupil, teaching himself under the direction of the master.

It is, in short, as said before, the method by which all learners — whether the little child in nature's infant school, or the adult man in the school of science — learn whatever they really know. In both cases, the essential basis of all mental progress is a knowledge of facts — a knowledge which, to be fruitful, must be gained at first hand, and not on the report of others, must be strict and accurate, and must be firmly retained. These are the essential conditions for the subsequent operations by which knowledge is appropriated, assimilated, and incorporated with the organic life of the mind. On this point, however, I cannot further dwell.

In order to make the principles of Jacotot's method clearer by a practical example, I will give, in some detail, an account of his plan of teaching Reading.

In this method, the sacred mysteries of *b-a*, *ba*; *b-e*, *be*, in pronouncing which, Dr. Bell gravely tells us, "the sound is an echo to the *sense*," are altogether exploded; those *columns* too, all symmetrically arranged in the vestibule of the temple of knowledge to the dismay of the young pilgrim to its shrine, are entirely ignored. The sphynx of the alphabet never asks him what *see-a-tee* spells, nor devours him if he fails to give the impossible answer, *cat*. The child who has already learnt to speak by hearing and using whole words, not separate letters—saying *baby*, not *bee-a, bee-wy*—has whole words placed before him. These words are at first treated as pictures, which have names that he has to learn to associate with the forms, in the same way that he already calls a certain animal shape a *cow*, and another a *dog*, and knows a certain face as *mamma's*, and another as *papa's*. Suppose we take a little story, which begins thus:—

"Frank and Robert were two little boys about eight years old."

There is, of course, a host of reasons to show the unreasonableness of beginning to teach reading by whole words. We ought, we are told, to begin with the elements, put them together for the child, arrange words in classes for him, keep all difficulties out of his way, proceed step by step from one combination to another, and so on. Reflecting, however, that Nature does not teach speaking nor give her object-lessons in this way, but first presents wholes, aggregates, compounds, which her pupil's analytic faculty resolves into their elements, the teacher sets aside all these speculative difficulties; and, believing in the native capacity of the child to exercise on printed words the same powers which he has already exercised on spoken words, forms the connection between the two by saying to the child, "Look at me" (not at the book). He then very deliberately and distinctly, but without grimacing, utters the sound "Frank" two or three times, and gets the child to do the same repeatedly, so as to secure from the first a clear and firm articulation. He then points to the printed word, repeats "Frank" and requires the child, in view of it, to utter the same sound several times. The first word is learned and known. The teacher adds "and." The child reads "Frank and." The teacher adds "Robert." The child reads "Frank and Robert." The teacher asks, "Which is 'Robert'? 'and'? What is that word?" (pointing to it), "and that?" &c. The teacher says, "Show me 'and,' 'Robert,' 'Frank,' in the same page—in any page."

The same process is repeated with the rest of the words of the sentence, and comes out thus:—

Frank
Frank and
Frank and Robert
Frank and Robert were, &c. ;

the pupil is told each word once for all, and repeats from the beginning, that nothing may be forgotten. By thus (1) learning, (2) repeating, he exercises perception and memory.

Suppose that the next sentences are —

"They were both very fond of playing with balls, tops, and marbles.

"One day, as they were playing in the garden, it began to thunder very loud and to rain very hard.

"So they ran under the apple tree."

All the words of these sentences may be gradually learned, in the same way, in four, six, or ten lessons. There is no need for haste. The only thing needful is accurate knowledge — to have something (*quelque chose*) thoroughly, perfectly, immoveably known (*imperturbablement apprise*).

The child has up to this point imitated the sounds given him, has associated them with the signs, has exercised observation and memory; so that wherever he meets with these words in his book, the sign will suggest the sound — or given the sound, he will at once point out the sign.

The teacher may now, if he thinks fit, begin to exercise the child's analytical and inductive faculties; not, however, necessarily on any symmetrical plan. He says, "Look at me," and pronounces very distinctly *f-rank*, repeating the process in view of the printed word. He does the same with *f-ond* and *f-ast*, and asks the child, "Which letter is *f*?" (the articulation not the name *ef*), The child points it out, and in this way *f* (that is, the articulation, the power of it) is learned and known.

The teacher covers over the *f* in *frank*, and asks what is left. The child replies "rank." The teacher proceeds as before, uttering *r-ank*, and requiring the child to read for himself *R-obert*, *r-ain r-an*, and thus the articulation of initial *r* is mastered. In the same way, the articulation *l* is gained from *l-ittle* and *l-oud*. Nor do the mutes, as *b* and *p* present any difficulty. The utterance of *b-oys*, *b-oth*, *b-alls*, *b-egan* suggests the necessary configuration of the organs, and the function of these letters is appreciated.

The teacher may next, if he pleases, though it is not necessary to anticipate the natural results of the process, try the synthetic or combining powers of the child. He writes on a black-board, in printing letters, the words, *fold*, *falls*, *fops*, *fain*, *frond*, *fray*, *ray*, *rap*, *lank*, *flank*, *last*, *loth*, *lops*, *let*, *lair*, *lap*, *bank*, *bat*, *bold*, *bay*, *blank*, &c., and requires the child, *without any help whatever*, to read them himself. Most children will do this at once. If there is any difficulty, a simple reference, to the words *Frank*, *little*, *boys*, &c., without any explanation, will immediately dispel it.

It is not necessary, I repeat, for the teacher thus to anticipate the inevitable results of the process. The quickened mind of the pupil will, of its own accord, analyze and combine, in its natural instinct to interpret the unknown by the known. The only essential parts of the process are learning and repeating from the beginning; all the rest depends on these. And in guiding the mind of the pupil to the intellectual use of his materials, the teacher should be under no anxiety about the length of the process. He should often practise a masterly inactivity; should know how to gain time by losing it—to advance by standing still. If he have a genuine belief in the native capacity of his pupils' minds, he need have no fear as to the result. The pupil (1) learning, (2) repeating, (3) reflecting—*i. e.*, analyzing or de-composing, (4) re-combining, is all along employing his active powers as an observer and investigator, and learns at length to read accurately and to articulate justly. The names of the letters may be given him when he has thus learned their powers. It is a convenience, nothing more, to know them. The young carpenter saws and planes no better for knowing the names of his tools.

Such, then, is Jacotot's method applied to the teaching of Reading. It ought, by theory, to accomplish this object, and it *does*. While philosophers are discussing the propriety of learning a subject without beginning *secundum artem* at what they call the beginning, the child, like the epic poet, dashes *in medias res*, and arrives at the end long before the discussion is over. A young investigator of this school, initiated in the habit of actively employing his mind on the subject of study, laughs at the ingenious arrangements, however kindly meant, furnished by various spelling-book makers, to aid him in his career. He turns aside from *ram*, *rem*, *rim*, *rom*, *rum*—*adge*, *edge*, *idge*, *odge*, and *udge*,—indeed, from all the scientific permutations made for him on the assumption that he cannot make them himself. He is told that there is a go-cart provided to help him to walk,—that the food is ready minced for his eating: but he chooses to walk and comminute his food for himself. Why should we prevent him?

This method is essentially the same as Mr. Curwen's "Look and

Say Method," and that of the little book entitled "Reading without Spelling, or the Teacher's Delight;" the only difference being that the teacher here employs the process consciously as a means of developing and training the mental powers as well as of teaching to read, of education as well as of instruction.

My pleasant task is now done. I have left much unsaid that I wished to say; and in criticising others, have, no doubt, exposed myself to criticism. As that is the common lot, I ought not to complain of it. I will, in conclusion, go over the main points which I have touched upon in the three lectures.

In my first Lecture I endeavored to show that education is both a science and an art, and that the principles of the science account for, explain, and give laws to the processes of the art; that the educator's own education is incomplete without a knowledge of these principles, which are ultimately grounded on those of Physiology, Psychology, and Ethics; that this knowledge is useful, not only in its application to the normal phenomena occurring in practice, but especially to the abnormal, which demand for their treatment all the resources of the science; that knowledge of this kind is comparatively rare among educators, and that its rarity is the main cause of the unsatisfactory condition of much of our education.

In the second Lecture, assuming the education of the educator, and confining myself to teaching, or the art of intellectual education, I endeavored to show that the teacher ought, in the first place, to have a just conception of his relation to his pupil; that this was gained by his seeing in the child one who had learned, or taught himself, all that he already knew, and inferring, therefore, that it was his business to continue the process already begun; that it thus appeared that the child's process of learning was, to a great extent, a guide to the teacher's process of teaching, and that the joint operation in which both were engaged resolved itself into the superintendence, or direction, by the teacher, of the pupil's method of self-instruction.

In this Lecture, I have shown that a *method* of teaching any subject is a special mode of applying the *art* of teaching; that to be a good method, it must have certain characteristics, deduced from successful practice, and ultimately referable to the principles of the science of education, and I have described, and to some extent criticized, a few well-known methods.

My simple aim, in these Lectures, has been to lead the educator to form a high idea of his work; to show that there are principles underlying his practice which it is important for him to know, and to induce him to study and apply them, not only for his own sake, but as a protest against the despotism of routine, which has so long hindered education from claiming its professional rights in England. I trust I have not altogether failed to accomplish my purpose.

APPENDIX.

I.—THE RELATIVE CLAIMS OF SCIENCE AND LITERATURE IN THE CURRICULUM OF SCHOOL INSTRUCTION.

Lest it should be supposed that the writer believes that the teaching of science ought to constitute of itself the curriculum of school instruction or indeed to form its vital characteristic, he begs to append an extract from a lecture he delivered at the College of Preceptors in 1866, on "The Curriculum of Modern Education."— This passage will show his opinion of the relative value of scientific and literary instruction generally, and is quite consistent with the argument advanced in these lectures, that the earliest *instruction* of children ought to be a *continuation* of the natural process by which they have learnt what they already know, and that this rudimentary course of practice in the art of observing and discovering is the best preparation both for scientific and literary studies. It is for the sake of literary studies themselves, and in order that they may be more efficiently pursued by applying to them the method of scientific instruction, that the writer recommends the preliminary training of the mind on natural objects. All teaching, whatever be its subject, should be scientific in its spirit, if it is to be really quickening. How far the ordinary grammar-school instruction is so, may be seen by the evidence given before the Public Schools Commission of 1862-3, the general result of which is thus pithily stated by the Senior Censor of Christ Church:— "The mass of young men, on entering the University (from the public schools), have everything to learn, and no desire to learn anything. In fact, very few of those who are candidates for matriculation can construe with accuracy a piece from an author whom they profess to have read. We never try them with an unseen passage; it would be useless to do so." The Junior Censor of Christ Church adds:—"The average men (from the public schools) bring up but small results of the training to which they have been subjected for years. There is a general want of accuracy in their work. . . . They come up to us with very unawakened minds, and habits of mental indolence and inaccuracy." A third witness, a public examiner of Oxford, also testifies that "the boys are not well grounded in the subjects to which most of their time has been given; and on other points, less strictly academical, their ignorance is sometimes surprising. . . . The mass of boys sent out from Eton are very ignorant indeed." It is difficult to believe that the teaching which produces such results as these can be scientific in its character or quickening in its spirit.

"If science, then, is to constitute a real discipline for the mind, much, nay everything, will depend on the manner in which it is studied. In the first place, it is to be remembered that the pupil is about to study things, not words; and therefore treatises on science are not, in the first instance, to be placed before him. He must commence with the accurate examination of the objects and phenomena themselves, not of descriptions of them prepared by others. By this means, not only will his attention be excited, the power of observation previously awakened much strengthened, and the senses exercised and disciplined, but the very important habit of doing homage to the authority of facts, rather than to the authority of men, be initiated. These different objects and phenomena may be placed and viewed together, and thus the mental habits of comparison and discrimination may be usefully practised. They may, in the next place, be methodically arranged and classified, and thus the mind may become accustomed to an orderly arrangement of its knowledge. Then the accidental may be distinguished from the essential, the common from the special, and so the habit of generalization may be acquired; and lastly, advancing from effects to causes, or conversely from principles to their necessary conclusions, the pupil becomes acquainted with induction and deduction — processes of the highest value and importance. It is no small advantage, moreover, that this kind of study affords, both in its pursuit and in its results — both in the chase and the capture — a very large amount of legitimate and generous mental pleasure, and of a kind which the pupil will probably be desirous of renewing for himself after he has left school. After all, however, it will be observed, that while the study of the physical sciences tends to give power over the material forces of the universe, it leaves untouched the greater forces of the human heart; it makes a botanist, a geologist, an electrician, an architect, an engineer, but it does not make a man. The hopes, the fears, the hatreds, and the loves; the emotions which stir us to heroic action, the reverence which bows in the presence of the inexpressibly good and great; the sensitive moral taste which shrinks from vice, and approves virtue; the sensitive mental taste which appreciates the sublime and beautiful in art, and sheds delicious tears over the immortal works of genius — all this wonderful world of sensation, emotion, and thought lies outside of that world which is the especial object of the study of the physical sciences." ("The Curriculum of Modern Education," pp. 18, 19.)

PRINCIPLES

OF

THE SCIENCE OF EDUCATION.

I. GENERAL PRINCIPLES.

1. Every child is an organism, furnished by the Creator with inherent capabilities of action, and surrounded by material objects which serve as stimulants to action. **The child an organism.**

2. The channels of communication between the external stimulants and the child's inherent capabilities of action are the sensory organs, by whose agency he receives impressions. **Agency of the sensory organs.**

3. These impressions, or sensations, being incapable of resolution into anything simpler than themselves, are the fundamental elements of all knowledge. The development of the mind begins with the reception of sensations. **Sensations the elements of knowledge.**

4. The grouping of sensations forms perceptions, which are registered in the mind as conceptions or ideas.* The development of the mind, which begins with the reception of sensations, is carried onward by the formation of ideas. **Sensations grow into ideas.**

5. The action and reaction between the external stimulants and the mind's inherent powers, involving processes of development† and implying growth, may be regarded as constituting a system of natural education. **Natural education.**

6. A system of education implies—(1) an educating influence, or educator; (2) a being to be educated, or learner; (3) matter for the exercise of the learner's powers; (4) a method by which the action of these powers is elicited; and (5) an end to be accomplished. **What is involved in a system of education.**

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* By "conception," or "idea," is meant the trace, residuum, or ideal substitute which represents the real perception.

† The term "development" is here employed for that unfolding of the natural powers of which "growth" is the registered result.

The coefficients, means, and ends of natural education.

7. In the case before us, the educating influence, or educator, is God, represented by Nature, or natural circumstances; the being to be educated, or learner, a child; the matter, the objects and phenomena of the external world; the method, the processes by which this matter is brought into communication with the learner's mind; and the object or end in view, intellectual development and growth.

In view of the different agencies concerned in effecting this intellectual education, and of their mutual relation, we arrive at the following:

II. PRINCIPLES OF NATURAL EDUCATION.

The educator learns from the child how to teach him.

I. Nature, as an educator, recognizes throughout all his operations the inherent capabilities of the learner. The laws of the learner's being govern the educator's action, and determine what he does, and what he leaves undone. He ascertains, as it were, from the child himself how to conduct his education.

The educator's function.

II. The natural educator is the prime mover and director of the action and exercise in which the learner's education consists.

Motives employed by the educator. The most influential, the satisfaction of the learner in gaining knowledge by himself.

III. The natural educator moves the learner's mind to action by exciting his interest in the new, the wonderful, the beautiful; and maintains this action through the pleasure felt by the learner in the simple exercise of his own powers — the pleasure of developing and growing by means of acts of observing, experimenting, discovering, inventing, performed by himself — of being his own teacher.

The educator purveys materials, and stimulates the child's mind to work upon them.

IV. The natural educator limits himself to supplying materials suitable for the exercise of the learner's powers, stimulating these powers to action, and maintaining their action. He co-operates with, but does not supersede, this action.

What the child does himself educates him.

V. The intellectual action and exercise in which the learner's education essentially consists are performed by himself alone. It is what he does himself, not what is done for him, that educates him.

The child a learner who teaches himself.

VI. The child is therefore a learner who educates himself under the stimulus and direction of the natural educator.

The child learns by personal experience.

VII. The learner educates himself by his personal experience; that is, by the direct contact of his mind at first hand with the matter — object or fact — to be learned.

VIII. The mind, in gaining knowledge for itself, proceeds from the concrete to the abstract, from particular facts to general facts, or principles; and from principles to laws, rules, and definitions; and not in the inverse order.

The mind proceeds from the concrete to the abstract.

IX. The mind, in gaining knowledge for itself, proceeds from the indefinite to the definite, from the compound to the simple, from complex aggregates to their component parts, from the component parts to their constituent elements — by the method of Investigation. It employs both Analysis and Synthesis in close connection.

The mind proceeds by the method of Investigation.

X. The learner's process of self-education is conditioned by certain laws of intellectual action. These are — (1) the Law of Consciousness; (2) of Attention, including that of Individuation, or singling out; (3) of Relativity, including those of Discrimination and Similarity; (4) of Retentiveness including those of Memory and Recollection; (5) of Association, or Grouping; (6) of Reiteration, or Repetition, including that of Habit.

The laws of intellectual action.

XI. Memory is the result of attention, and attention is the concentration of all the powers of the mind on the matter to be learned. The art of memory is the art of paying attention.

Memory the result of attention.

XII. Ideas gained by personal experience are subjected by the mind to certain processes of elaboration; as classification abstraction, generalization, judgment, and reasoning. These processes imply the possession of ideas gained by personal experience, and they are all performed by the youngest child who possesses ideas.

Processes of mental elaboration.

XIII. The learner's knowledge consists in *ideas*, gained from objects and facts by his own powers, and consciously possessed — not in *words*. The natural educator, by his action and influence, secures the learner's possession of clear and definite primary ideas. Such ideas, so gained, are necessarily incorporated with the organic life of the learner's mind, and become a permanent part of his being.

Knowledge consists in ideas, not in words.

XIV. Words are the conventional signs, the objective representatives, of ideas, and their value to the learner depends on his previous possession of the ideas they represent. The words, without the ideas, are not knowledge to him.

Words without ideas are not knowledge to the child.

XV. Personal experience is the condition of development, whether of the body, mind, or moral sense. What the child does himself, and loves to do, forms his habits of doing; but the natural educator, by developing his powers and promoting

The growth of body, mind, and conscience the result of self-education.

their exercise, also guides him to the formation of right habits. He therefore encourages the physical development which makes the child healthy and robust, the intellectual development which makes him thoughtful and reasonable, and the moral development which makes him capable of appreciating the beautiful and the good. This threefold development of the child's powers tends to the formation of his bodily, mental, and moral character, and prepares him to recognize the claims of religion.

Definition of education.

XVI. Education as a whole consists of development and training, and may therefore be defined as "the cultivation of all the native powers of the child, by exercising them in accordance with the laws of his being with a view to development and growth."

These principles constitute the Science of Natural Education.

The above general facts or principles being the results of an analytical investigation into the nature of the child as a thinking being, and into the processes by which his earliest education is carried on, constitute the Science of Natural Education.

Natural Education the model of Formal Education.

But as it is the same mind which is to be cultivated throughout, Natural Education is the pattern or model of Formal Education, and consequently the Science of Natural Education is the Science of Education in general.

The formal educator must therefore recognize that in his practice.

The formal educator or teacher, therefore, who professes to take up and continue the education begun by Nature, is to found his scheme of action upon the above principles, and in supplementing and complementing the natural educator's work, he is to proceed on the same lines. He is not to intrude modes of action which contravene and neutralize the principles of natural education.

III. THE ART OF EDUCATION.

Art the application of Science.

1. Art is the application of the laws of Science to a given subject under given circumstances.

Art the explicit display of the implicit principles of Science.

2. The Art of Education, or Teaching, is the explicit display of the implicit principles of the Science of Education.

The child a learner who teaches himself.

3. The principles already stated set the child or pupil before us as one who gains knowledge for himself, at first hand, by the exercise of his own native powers, through personal experience, and therefore as a learner who teaches himself.

4. This is the central principle of the Art of Teaching. It serves as a limit to define both the functions of the formal teacher, and the nature of the matter on which the learner's powers are first to be exercised — that is, of the subject of instruction.

This central principle a limit.

5. The limit which includes also excludes — it proscribes as well as prescribes. The teacher who regards the child as a learner who is to teach himself through personal experience is therefore interdicted from doing anything to interfere with the learner's own method,— from telling, cramming, explaining, and even from correcting, merely on his own authority, the learner's blunders. The function assigned him by the Science of Education is that of a stimulator, director, and superintendent of the learner's work, and to that office he is to confine himself.

It limits or defines the function of the educator.

6. But the limit in question determines also the character of the matter on which the learner's powers are to be first exercised. If he is to teach himself, he can only do so by exercising his mind on concrete objects or actions — on facts. These furnish him with ideas. He cannot teach himself by abstractions, rules, and definitions, packed up for him in words by others; for these do not furnish him with ideas of his own. In all that he has to learn he must begin with facts — that is, with personal experience. It is clear, then, that the conception of the learner as a self-teacher determines both the manner in which he is to be taught and the means.

It also determines the nature of the matter to be learnt.

7. This notion of the Art of Teaching, which has specially in view the period of the child's life when the formal teacher first takes him in hand, in order to develop and train his mind, is capable of general application. It applies therefore, with the requisite modifications, to instruction properly so called, which consists in the orderly and systematic building of knowledge into the mind, with a definite object.

The general principle applies both to education and direct instruction.

8. The teacher, therefore, educates by instructing, and instructs by educating. Education and instruction are different aspects of the same process.

The teacher educates by instructing, and instructs by educating.

9. The sum of what has been laid down is, that the Art of Education consists in the practical application of principles gained by studying the nature of the child; the central principle, which governs all the rest, being that it is what the child does for and by himself that educates him.

Summary.

THE IMPORTANCE OF THE TRAINING OF THE TEACHER.

THIS subject, on which much has been at various times written and said to little practical purpose, is again coming to the front as one of paramount importance. No apology, therefore, is needed for pressing the consideration of it on the attention of all who are interested in the progress of education, and especially of all who are interested in the "National Union for improving the education of women of all classes."

Among the "objects" aimed at by the Union, one made especially prominent is this:—"To raise the Social Status of female teachers, by encouraging women to make teaching a profession, and to qualify themselves for it by a sound and liberal education, and by thorough training in the art of teaching." The "Social" bearings of the subject have been already treated by Miss Shirreff in No. 3 of this series of pamphlets, and it is not necessary here further to speak of them. The special object I have in view is to call attention to "the training of the teacher in the art of teaching," and to show what is and what is not indicated by that expression.

In the first place, however, I wish to make a few remarks on the term "profession," as applied to teaching. It cannot be said, strictly, that we have in England, at this moment, any profession of teaching. The term "profession," when properly, that is, technically employed, connotes or implies "learned;" and involves the idea of an incorporated union of persons qualified by attainments and by a scientific training for a particular calling in life, and duly authorized to pursue it. It is in this sense alone that the term is employed, in speaking of the professions of law, medicine and theology. As, however, in the case of education—and speaking particularly of secondary education—no positive attainments, no special training, no authoritative credentials whatever are demanded as professional qualifications, it is obvious that there is, strictly speaking, no profession of teaching amongst us, and that when we use the term "profession" in this application of it, we use it in a vague, inaccurate and untechnical sense. As to attainments none whatever are required of the person who "professes" to teach. The profound ignoramus, if sufficiently endowed with assurance, may compete for public patronage on nearly equal terms with the most cultivated student of learning and science, and may in many cases even carry off the prize; while as to training, the teacher who has severely disciplined his mind by the study of the theory of education, and carefully conformed his practice to it, scarcely stands a better chance of success than the ignorant pretender who cannot even define the term "education;" who has no conception of the meaning of "training;" and whose empirical self-devised methods of instruction constitute the sum total of his qualifications for the office he assumes.

Lastly, as to credentials, both classes of teachers, the qualified and the unqualified, stand on precisely the same footing before the public. No authoritative *exequatur* distinguishes the competent from the incompetent teacher. Both jostle each other in the strife for pre-eminence, and the public look on all the while with indifference, apparently unconscious that their children's dearest interests are involved in the issue.*

It is obvious then, that as neither knowledge, training, nor credentials are required of a teacher, there can be no "profession of teaching." The assumption, however, that there is such a profession, and that any one who pleases may claim to be a member of it, has proved very injurious to the interests of the public. Girls left unprovided for, young widows left in a similar predicament, and many others suddenly plunged into difficulties and obliged to cast about for a livelihood, often can think of no other employment than that of teaching, which, as being in common parlance "professional," is therefore "genteel;" and accordingly, without a single qualification, often with the disqualification that they have nearly all their previous lives regarded teachers and teaching with contempt, declare themselves before the world ready to teach. The declaration, if it means anything, means that they profess themselves ready to undertake the practice of an art which, beyond most others, requires peculiar knowledge, experience, culture, and tact. It means further, that they are prepared to watch over the development of a child's growing mind, to furnish it with suitable mental food at the proper time; to see that the food is thoroughly digested; to stimulate it to exercise its faculties in the right direction; to curb its aberrations; to elicit the consciousness of independent power; to form, in short, habits of thinking for life-long use. All this, and very much more, is really involved in the conception we ought to form of a teacher's functions; and yet we see every day persons who have not even a conception of this conception: persons destitute of all knowledge of the subjects they profess to teach, of the nature of the mind which is to be taught, of the practical art itself, of the principles of education which underlie the art, and of the experience of the most eminent instructors, blindly and rashly forcing themselves before the world as teachers. Such persons seem not to be aware that if with similar qualifications they were to undertake to practise the arts of medicine, law, architecture, engineering, or music, they would be laughed at everywhere. Yet these very persons, who would be instinctively conscious of their incompetency, without knowledge or training, to perform a surgical operation, to steer a vessel, to build a house, or to guide a locomotive, are ready, at a moment's warning, to perform any number of operations on a child's mind, and to undertake the direction of its mental or moral forces — a task, considering the delicacy of the machinery with which they have to deal, more difficult in many respects than any other that can be named.

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* See Appendix.

In maintaining, however, generally that the professor of an art should understand its principles, and that he cannot understand them without study and training, I do not mean to assert that there may not be found among those who feel themselves suddenly called upon to act as teachers, especially among women, many, who without obvious preliminary training, are really already far advanced in actual training for the task they assume. In these cases, superior mental culture, acute insight into character, ready tact and earnest sympathy constitute, *pro tanto*, a real preparation for the profession; and supply, to a considerable extent, the want of technical training. To such persons it not unfrequently happens that a matured consciousness of the importance of the task they have undertaken, and actual contact with the work itself, rapidly suggest what is needed to supplement their inexperience. Such cases, however, as being rare and exceptional, are not to be relied on as examples. Even in them, moreover, a thoughtful study of the Science of Education, and of the correlated Art, would guide the presumed faculty to better results than can be gained without it.

We can have little hesitation then in asserting that the pretension to be able to teach without knowing even what teaching means; without mastering its processes and methods as an art; without gaining some acquaintance with its doctrines as a science; without studying what has been said and done by its most eminent practitioners, is an unwarrantable pretension which is so near akin to empiricism and quackery,* that it is difficult to make the distinction.

There are, however, two or three fallacious arguments sometimes urged against the preliminary training of the teacher which it is important briefly to discuss.

The first is, that "granting the need of such training for teachers of advanced subjects, it is unnecessary for the teaching of elementary subjects. Anybody can teach a child to read, write, and cipher." This is, no doubt, true, if teaching means nothing more than mechanical drill and cram; but if teaching is an art and requires to be artistically conducted, it is not true. A teacher is one who, having carefully studied the nature of the mind, and learned by reading and practice, some of the means by which that nature may be influenced, applies the resources of his art to the child-nature before him. Knowing that in this nature there are forces, moral and intellectual, on the development of which the child's well-being depends, he draws them forth by repeated acts, exercises them in order to strengthen them, trains them into faculty, and continually aims at making all that he does, all that he gets his pupils to do, minister to the consciousness of growth and power in the child's mind. If this is a correct description of the teacher's function, it is obvious that it applies to every department of the teacher's work; as much to the teaching of reading and arithmetic as to that of Greek plays, or the Differential Calculus. The function does not change with the subject. But I go further, and maintain that the beginning of the process of education is even more important in some respects than the later stages. *Il n'y a que le premier pas qui coûte.* The teacher who takes in hand the instruction and direction of a mind which has never been taught before, commences a series of processes, which by our theory should have a definite end in view — and that end is to induce in the child's mind the consciousness of power. Power is, of course, a relative term, but it is not inapplicable to the case before us. The teacher, even of reading, who first directs the child's own observation on the facts in view — the combination of the letters in separate words or syllables — gets him to compare these combinations together, and notice in what respect they differ or agree, to state himself the difference or agreement — to analyze each new compound, into its known and unknown elements, applying the known, as far as possible, to interpret the unknown — to refer each fresh acquisition to that first made, to find out for himself everything which can be found out through observation, inference and reflection — to look for no help, except in matters (such as the sounds) which are purely conventional — to teach himself to read, in short, by the exercise of his own mind — such a teacher, it is contended, while getting the child to learn how to read, is in fact, doing much more than this — he is teaching the child how to use his mind — how to observe, investigate, think.* It will probably be granted that a process of this kind — if practicable — would be a valuable initiation for the child in the art of learning generally, and that it would necessarily be attended by what I have described as a consciousness of power. But, moreover, — which is also very important — it would be attended by a consciousness of pleasure. Even the youngest child is sensible of the charm of doing things himself — of finding out things for himself; and it is of cardinal importance in elementary instruction to lay the grounds for the association of pleasure with mental activity. It would not be be difficult, but it is unnecessary, to contrast such a method as this, which awakens all the powers of the child's mind, keeps them in vivid and pleasurable exercise, and forms good mental habits, with that too often pursued, which deadens the faculties, induces idle habits, distaste for learning, and incapacity for mental exertion.

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* "Empiric; one of a sect of ancient physicians, who practised from experience, not from theory." — "Quack; a boastful pretender to arts he does not understand."

It is clear, then, that "any teacher" cannot teach even reading, so as to make it a mental exercise, and, consequently, a part, of real education — in other words, so as "to make all that he does, and all he gets his pupil to do, minister to the consciousness of growth and power in the child's mind." So far then from agreeing with the proposition in question, I believe that the early development of a child's mind is a work that can only effectually be performed by an accomplished teacher; such a one as I have already described. In some of the best German elementary schools men of literary distinction, Doctors in Philosophy, are employed in teaching children how to read, and in the highly organized Jesuit Schools, it was a regulation that only those teachers who had been specially successful in the higher classes should be entrusted with the care of the lowest.

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* See this process fully described in the Author's third lecture "On the Science and Art of Education," published by the College of Preceptors, p. 68.

There is, moreover, another consideration which deserves to be kept in view in discussing the competency of "any teacher" to take charge of a child who is beginning to learn. Most young untrained teachers fancy when they give their first lesson to a child who has not been taught before, that they are commencing its education. A moment's reflection will show that this is not the case. They may indeed be commencing its formal education, but they forget that it has been long a pupil of that great School, of which Nature is the mistress, and that their proper function is to *continue* the education which is already far advanced. In that School, observation and experiment, acting as superintendents of instruction, through the agency of the child's own senses, having taught it all it knows at the time when natural is superseded, or rather supplemented by formal education. Can it then be a matter of indifference whether or not the teacher understands the processes, and enters into the spirit of the teaching carried on at that former School; and is it not certain that his want of knowledge on these points will prove very injurious to the young learner? The teacher who has this knowledge will bring it into active exercise in every lesson that he gives, and, as I have shown in the case of teaching to read, will make it instrumental in the development of all the intellectual faculties of the child. He knows that his method is sound, because it is based on Nature; and he knows, moreover, that it is better than Nature's, because it supersedes desultory and fortuitous action by that which is organized with a view to a definite end. The teacher who knows nothing of Nature's method, and fails, therefore, to appreciate its spirit, devises at haphazard a method of his own which too generally has nothing in common with it, and succeds in effectually quenching the child's own active energies; in making him a passive recipient of knowledge, which he has had no share in gaining; and in finally converting him into a mere unintellectual machine. Untrained teachers, especially those who, as the phrase is, "commence" the education of children, are, as yet, little aware how much of the dulness, stupidity, and distaste for learning which they complain of in their pupils, is of their own creation. The upshot then of this discussion is, not that "any teacher," but only those teachers who are trained in the art of teaching can be safely entrusted with the education of the child's earliest efforts in the career of instruction.

Another fallacy, which it is important to expose, is involved in the assumption, not unfrequently met with, that a man's "choosing to fancy that he has the ability to teach, is a sufficient warrant for his doing so," leaving, it is added, "the public to judge whether or not he is fit for his profession." Ridiculous as this proposition may appear, I have heard it gravely argued for and approved in a conference of teachers, many of whom, no doubt, had good grounds of their own for their adherence to it. Simply stated, it is the theory of free trade in education. Every one is to be at liberty to offer his wares, and it is the buyer's business to take care that he is not cheated in the bargain. It is unnecessary for my present purpose to say more on the general proposition than this — that the state of the market and the frequent inferiority of the wares invalidate the assumption of the competency of the buyer to form a correct estimate of the value of the article he buys, and, moreover, that an immense quantity of mischief may be, and actually is done to the parties most concerned, the children of the buyers, while the hazardous experiment is going on. As to the minor proposition, the man's "choosing to fancy that he has the ability" to teach is a sufficient warrant for his doing so, it is obviously in direct opposition to the argument I am maintaining. It cannot for a moment be admitted that a man's "choosing to fancy that he has the ability" to discharge a function constitutes a sufficient warrant for the indulgence of his fancy, especially in a field of action where the dearest interests of society are at stake. We do not allow a man "who chooses to fancy that he has the ability" to practise surgery, to operate on our limbs at his pleasure, and only after scores of disastrous experiments, decide whether he is "fit to follow the profession" of a surgeon. Nor do we allow a man who may "choose to fancy that he has the ability" to take the command of a man-of-war, to undertake such a charge on the mere assurance that we may safely trust to his "inward impulse." And if we require the strictest guarantees of competency, where our lives and property are risked, shall we be less anxious to secure them when the mental and moral lives of our children — the children of our commonwealth — are endangered? I repudiate then entirely this doctrine of an "inward impulse," which is to supersede the orderly training of the teacher in the art of teaching. It has been tried long enough, and has been found utterly wanting. Fallacies, however, are often singularly tenacious of life, and we are not therefore surprised at Mr. Meiklejohn's* assertion, that in more than 50 per cent. of the letters which he examined, the special qualification put forward by the candidates was their "feeling" that they could perform the duties of the office in question *to their own satisfaction.*" (!) This is obviously only another specimen, though certainly a remarkable one, of the "inward impulse" theory.

The third fallacy I propose to deal with is couched in the common assumption that "any one who knows a subject can teach it." There can be no doubt that the teacher should have an accurate knowledge of the subject he professes to teach, and especially for this, if for no other reason — that as his proper function is to guide the process by which his pupil is to learn, it will be of the greatest advantage to him as a guide to have gone himself through the process of learning. But, then, it is very possible that although his experience has been real and personal, it may not have been conscious — that is, that he may have been too much absorbed in the process itself to take account of the natural laws of its operation. This conscious knowledge of the method by which the mind gains ideas is, in fact, a branch of Psychology, and he may not have studied that science. Nor was it necessary for his purpose, as a learner, that he should study it. But the conditions are quite altered when he becomes a teacher. He now assumes the direction of a process which is essentially not his but the learner's; for it is obvious that he can no more think for the pupil than he can eat or sleep for him. His efficient direction, then, will mainly depend on his thoughtful conscious knowledge of all the conditions of the problem which he has to solve. That problem consists in getting his pupil to learn, and it is evident that he may know his subject, without knowing the best means of making his pupil know it too, which is the assumed end of all his teaching: in other words, he may be an adept in his subject, but a novice in the art of teaching it. Natural tact and insight may, in many cases, rapidly suggest the faculty that is needed; but the position still remains unaffected that knowing a subject is a very different thing from knowing how to teach it. This conclusion is indeed involved in the very conception of an art of teaching, an art which has principles, laws, and processes peculiar to itself.

But, again, a man profoundly acquainted with a subject may be unapt to teach it by reason of the very height and extent of his knowledge. His mind habitually dwells among the mountains, and he has therefore small sympathy with the toilsome plodders on the plains below. It is so long since he was a learner himself that he forgets the difficulties and perplexities which once obstructed his path, and which are so painfully felt by those who are still in the condition in which he once was himself. It is a hard task, therefore, to him to condescend to their condition, to place himself alongside of them, and to force a sympathy which he cannot naturally feel with their trials and experience. The teacher, in this case, even less than in the other, is not likely to conceive justly of all that is involved in the art of teaching, or to give himself the trouble of acquiring it. Be this, however, as it may, both illustrations of the case show that it is a fallacy to assert that there is any necessary connection between knowing a subject, and knowing how to teach it.

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* See Appendix.

Having now shown that the present state of public opinion in England, which permits any one who pleases to "set up" as a teacher without regard to qualifications is inconsistent with the notion that teaching is an art for the exercise of which preliminary training is necessary, and disposed of those prevalent fallacies which are, to a great extent, constituents of that public opinion, I proceed to give some illustrations of teaching as it is in contrast with teaching as it should be. The fundamental proposition, to which all that I have to say on the point in question must be referred, is this — that teaching, in the proper sense of the term, is a branch of education, and that education is the development and training of the faculties with a view to create in the pupil's mind a consciousness of power. Every process employed in what is called teaching that will not bear this test is, more or less, of the essence of cramming, and cramming is a direct interference with, and antagonistic to, the true end of education. Cramming may be defined for our present purpose as the didactic imposition on the child's mind of ready-made results, of results gained by the thought of other people; through processes in which his mind has not been called upon to take a part. During this performance the mind of the pupil is for the most part a passive recipient of the matter forced into it, and the only faculty actively employed is memory. The result is that memory instead of being occupied in its proper function of retaining the impression left on the mind by its own active operations, and being therefore subordinate and subsequent to those operations, is forced into a position to which it has no natural right, and made to precede, instead of waiting on, the mind's action. Thus the true sequence of causes and consequences is disturbed, and memory becomes a principal agent in instruction. If we further reflect that ideas gained by the direct action of the mind naturally find their proper place among the other ideas already existing there by the law of association, while those arbitrarily forced into it do so only by accident — for the mind receives only that which it is already prepared to receive — we see that cramming, which takes no account of preparedness, is absolutely opposed to development, that is to education in the true sense of the term. Cramming, therefore, has nothing in common with the art of teaching, and the great didactic truth is established that it is the manner or method rather than the thing taught, that constitutes the real value of the teaching.

Mr. D'Arcy Thompson, in his interesting book entitled "Wayside Thoughts," referring to the usual process of cramming in education, compares it to the deglutition by the boa constrictor of a whole goat at a meal, but he remarks that while the boa by degrees absorbs the animal into his system, the human boa often goes about all his life with the undigested goat in his stomach! There may be some extravagance in this whimsical illustration, but it involves, after all, a very serious truth. How many men and women are there who, if they do not carry the entire goat with them throughout life, retain in an undigested condition huge fragments of it, which press as a dead weight on the system — a source of torpidity and uneasiness, instead of becoming through proper assimilation a means of energy and power. The true educator, who is at the same time a genuine artist, proceeds to his work on principles diametrically opposed to those involved in cramming. In the first place he endeavors to form a just conception of the nature, aims, and ends of education, as of a theory which is to govern his professional action. According to this conception "education is the training carried on consciously and continuously by the educator with the view of converting desultory and accidental force into organized action, and of ultimately making the child operated on by it a healthy, intelligent, moral, and religious man." Confining himself to intellectual training, he sees that this must be accomplished through instruction, which is "the orderly placing of knowledge in the mind with a definite object; the mere aggregation of incoherent ideas, gained by desultory and unconnected mental acts being no more instruction than heaping bricks and stone together is building a house."* These conceptions of the nature and aim of education, and of its proper relation to instruction, suggest to him the consideration of the means to be employed. These means to be effectual must have an exact scientific relation to the nature of the machinery that is to be set in motion; a relation which can only be understood by a careful study of the machinery itself. If it is a sort of machinery which manifests its energies in acts of *observation*, *perception*, *reflection*, and *remembering*, and depends for its efficacy upon *attention*, he must study these phenomena subjectively in relation to his own conscious experience, and objectively as exhibited in the experience of others. Regarding, further, this plexus of energies as connected with a base to which we give the name of mind, he must proceed to study the nature of the mind in general, and especially note the manner in which it acts in the acquisition of ideas. This study will bring him into acquaintance with certain principles or laws which are to guide and control his future action. The knowledge thus gained will constitute his initiation into the Science and Art of Education.

The Science or Theory of Education then is seen to consist in a knowledge of those principles of Psychology, which account for the processes by which the mind gains knowledge. It therefore serves as a test, by which the Art or Practice of Education may be tried. All practices which are not in accordance with the natural action of the mind in acquiring knowledge for itself are condemned by the theory of Education, and in this predicament is cramming, which consists in forcing into the mind of the learner the products of other people's thought. Such products are formulæ, rules, general abstract propositions, definitions, classifications, technical terms, common words even, when they are not the signs of ideas gained at first-hand by his own observation and perception. The Science of Education recognizes all these kinds of knowledge as necessary to the formation of the mind; but relegates them to their proper place in the course of instruction, and determines that that place is subsequent not antecedent to the action of the learner's mind on the facts which serve as their groundwork. Facts, then, things, material objects, natural phenomena; physical facts, facts of language, facts of nature, are the true, the all-sufficient pabulum for the youthful mind, and the careful study and investigation of them at first-hand, through his own observation and experiment are to constitute his earliest initiation in the art of learning. After this initiatory practice, which involves analysis and disintegration, come, as the natural sequence, the processes of reconstruction and classification of the elements obtained, induction, framing of definitions, building up of rules, generalization of particulars, construction of formulæ, application of technical terms, in all which processes the art of the teacher as a director of the learner's intellectual efforts is manifestly called into exercise; and the need of his own experimental knowledge of the processes he has to direct is too obvious to require to be insisted on.

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* See the Author's "Lectures on the Science and Art of Education."

The comprehensive principle here enunciated, which regards even the learning by rote of the multiplication table and Latin declensions, antecedently to some preliminary dealing with the facts of Latin and the facts of number, as of the essence of cramming, will be theoretically received or rejected by teachers just in proportion as they receive or reject the conception of an art of teaching founded on intellectual principles. It is obvious enough that cramming knowledge into the memory, without regard to its fitness for mental digestion, if an art at all, is an art of a very low order, and has little in common with that which consists in a conscious appreciation of the means whereby the mind is awakened to activity, and its energies trained to independent power. The teacher, in fact, in the one case is an artist, scientifically working out his design in accordance with the principles of his art, and ready to apply all its resources to the emergencies of practice; in the other case, he is an artisan empirically working by rule-of-thumb, unfurnished with principles of action, and succeeding, when he succeeds at all, through the happy accident that the pupil's own intellectual activity practically defeats the natural tendency of the teacher's mechanical drill.

I do not, however, by any means pretend to assert that every teacher who declines to accept this notion of teaching as an art, is an artisan. It often happens that a man works on a theory which he does not consciously appreciate, and in his actual practice obviates the objection which might be taken against some of his processes. Hence we find teachers, while denouncing such expressions as "development and cultivation of the intelligence" as "frothy,"* doing practically all they can to develop and cultivate the intelligence of their pupils. Such teachers do indeed violently drive "the goat" into the stomach of their pupils, but when they have got it there take great pains to have it digested in some fashion or other. I believe that the process would be much facilitated by their knowing something of the physiology of digestion, but I do not therefore designate such practitioners as artisans. At the same time I do not call them artists, for their procedure violates nature, and true art never does that. The epithet artisan may however be restricted to those — and their number is legion — whose practice consists of cramming *pur et simple*.

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* See a letter in the "Educational Times," for December, 1872, from the Rev. E. Boden, Head Master of the Clitheroe Royal Grammar School.

On the whole, then, I contend that if we could examine the entire practice of those teachers who actually succeed in endowing the large majority — not a select few — of their pupils with sound and systematic knowledge, and with well-informed minds, we should find that, whatever be their theoretic notions, they have worked on the principles on which I have been all along insisting. They have succeeded by the development and cultivation of the intelligence of their pupils, and by nothing else, and they have succeeded just in proportion as they have consciously kept this object in view. Let us hear what Dean Stanley tells us of Arnold's teaching. "Arnold's whole method was founded on the principle of awakening the intelligence of every individual boy. Hence it was his practice to teach, not, as you perceive, by downpouring, but by questioning. As a general rule he never gave information except as a reward for an answer, and often withheld it altogether, or checked himself in the very act of uttering it, from a sense that those whom he was addressing had not sufficient interest or sympathy to entitle them to receive it. His explanations were as short as possible, enough to dispose of the difficulty and no more, and his questions were of a kind to call the attention of the boys to the real point of every subject, to disclose to them the exact boundaries of what they knew and did not know, and to cultivate a habit not only of collecting facts, but of expressing themselves with facility, and of understanding the principles on which these facts rested." Such was Arnold's method of teaching; and it is obvious that *mutatis mutandis*, modified somewhat so as to apply to the earliest elementary instruction, it involves all the principles which I have contended for, as constituting the true art of teaching. The boys were, in fact, teaching themselves under the direction of the teacher without, or with the slightest, explanation on his part. They were using all their minds on the subject, and gaining independent power. Arnold, to use a famous French teacher's expression, was "laboring to render himself useless."

But I must draw these remarks to a conclusion. It is hardly necessary for me to state formally the principles for which I have been all along arguing.

The upshot is this — Teaching is not a blind routine but an art, which has a definite end in view. An art implies an artist who works by systematic rules. The processes and rules of art explicitly or implicitly evolve the principles involved in science. The art or practice of education, therefore, is founded on the science or theory of education, while the science of education is itself founded on the science of mind or psychology. The complete equipment and training of the teacher for his profession comprehends therefore: —

(*a.*) A knowledge of the subject of instruction.
(*b.*) A knowledge of the nature of the being to be instructed.
(*c.*) A knowledge of the best methods of instruction.

This knowledge gained by careful study and conjoined with practice, constitutes the training of the teacher.

APPENDIX.

A very instructive instance, as showing the popular estimate of the "qualifications" deemed necessary at this very moment for the equipment of the teacher, was recently brought forward by Mr. Meiklejohn, in a lecture delivered at the College of Preceptors. The Principal of a Ladies' College required the assistance of a Lady Superintendent to take charge of the educational work of her establishment. In reply to an advertisement, in which she stated the duties of the office and the salary offered (one hundred guineas per annum, with rooms and board) she received about nine hundred letters. In her perplexity under this *embarras de richesses*, Mr. Meiklejohn offered to look over, and report upon three hundred of these epistles. He found, as the result, that about five per cent. of them were "good and hopeful;" while the remaining ninety-five per cent. "showed every variety of incapacity and ignorance, and furnished examples of every kind of sin against common sense and the English language." As evidence on this last point, he quotes numerous instances of spelling; such as "widdow," "affraid," "caricter," "responcible," "schollar," "controle," "referrence," "exclent," "apoint an intervew," &c.; of expression; such as "yrs respectively," "quite compitant of undertaking," "with great kindness to young people, being exceedingly fond of the above," "wishes to resort to some capacity by way of employment," &c.; and of "qualifications;" such as "can refer to Cannons," "is not so strong in the chest as she used to be," "has gone through fever and small-pox cases very successively," "is a Baronness," "is the widow of 'a Commercial,' and has four small children," "has never held a similar post, and will soon be thirty-five," "has had experience in the management of a large institution for babies," "is of exceedingly imposing appearance," "at present fills a situation which she would be happy to resign," "can carve well and quickly," "can make nourishing soups, or get them made," &c., &c. It is sad to conceive of nine hundred distressed women catching thus eagerly at the offer of the salary, but even more sad, in the interest of education itself, to think of the mean idea they must have entertained of what is indicated by "educational work."

THEORIES OF TEACHING WITH THEIR CORRESPONDING PRACTICE.*

THERE are, as we know, many methods of teaching. There are, for instance, Ascham's, Hamilton's, and Ollendorf's method of teaching languages, and Pestalozzi's and Jacotot's methods of teaching generally; there are the methods of the old Grammar School, and those of the Dame Schools, and of the Kindergarten and a great many others. Each of these has a theory which underlies it and accounts for its specialty. Into the details, however, of various methods I am not about to enter; my purpose is the more general one of endeavoring to ascertain the leading spirit which pervades them all, independently, for the most part, of the details.

A little consideration of the subject, will, I believe, justify us in taking, as the criterion of this spirit, the aspect under which we regard the *relation of the teacher to the pupil*, and of both to their joint work. One teacher may regard the communication of his own ideas to his pupil as his proper and special function, and their minds as a sort *tabula rasa*, on which he has to write himself. According to this theory, he will then treat them merely as recipients, and will carefully tell them what they ought to receive, and how they ought to receive it. In placing facts before them, he will tell them what conclusions they are to draw from them. When his pupils commit faults he will correct them himself even though no use whatever is made of the corrections by them. He will be so careful that the pupil should not go wrong that he will continually interfere with his free action, by urging him to aim at this point and avoid that — in short, he will assume that the ability of the pupil to observe, compare, reason, think, depends almost entirely upon his own continual telling, showing, explaining, and thinking for him. Such a teacher evidently has a mean opinion of the pupil's powers, he assumes that they cannot work without the constant intervention of his own, and considers that in the joint operation carried on by himself and his pupil, he takes, and ought to take, the larger share.

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* Read at a meeting of the Education Department of the Social Science Association, Monday, April 26, 1869.

Another teacher entertains a very different view of the relation he sustains to his pupil. He sets out, indeed, with a different estimate of the pupil's native ability, which he regards as competent to observe facts, compare them together and draw inferences respecting them without any authoritative interference on his part. He sees this native faculty at work in daily life, and therefore knows that it can be employed in self-instruction. He trusts in it, therefore, and never tells the pupil what he can find out for himself; he does not superfluously explain relations between objects or facts which explain themselves by the simple juxtaposition of the objects and facts. He does not correct blunders which almost invariably arise either from insufficient knowledge or from carelessness: in the one case he requires the pupil to gain the knowledge required, or leaves the blunder for subsequent correction; in the other he demands more attention, and expects the pupil to correct his own blunders. He feels no inordinate anxiety about his pupil's occasional errors of judgment, provided that his mind is actively engaged in the subject under instruction, in short, seeing that the child is pursuing, in a natural way, his own self-teaching, he is anxious not to supersede his efforts by any needless, and probably injurious, interference with the process. He judges, therefore, that in the joint operation referred to it is the pupil and not himself who is to take the far larger share, inasmuch as the pupil's ultimate power of thinking will be in the inverse ratio of the teacher's thinking for him.

It is evident that these different conceptions of the relation between the teacher and the pupil are not easily reconcilable with each other, and that the practical results must be respectively very different. These results I will not now endeavor to estimate, but address myself to my immediate purpose, which is to maintain the latter theory, and to show that *learning is essentially self-tuition*, and *teaching the superintendence of the process;* and, in short, that compendiously stated, the essential function of the teacher consists in helping the pupil to teach himself.

It may be worth while to inquire for a few minutes into the exact meaning, as fixed by etymological considerations, of the words *learn* and *teach*. As words represent ideas, we may thus ascertain what conceptions were apparently intended to be represented by these or equivalent symbols. Now it does seem remarkable that, in European languages at least, to *learn* means to gather or glean for oneself — and *teach*, to guide or superintend. In no case that I am aware of do these words imply a correlation of *receptivity* on the one hand, with *communicativeness* on the other. A brief reference tò the facts will be sufficient to show this. I take the word *learn* first, because *learning* must precede *teaching*. *Learn*, in the earliest form of our language, which we erroneously call Anglo-Saxon instead of Original or Primitive English, was *leorn-ian*, a derivative of the simpler form *lær-an*, to teach. There is reason to believe that the longer form with the epenthetic *n* represents a class of words once not uncommon in Gothic languages, though now no longer recognized in practice — I mean words endued in themselves with the functions of reflective or passive verbs. Thus, in Mœso-Gothic, we have *lukan*, to shut or lock up, *lukn-an*, to lock oneself up, or to be locked up; *wak-an*, to wake another, *wakn-an*, to wake oneself, to be awake. We have the corresponding *awake* and *awaken* ourselves. If this analogy be correct, then *leorn-ian*, as connected with *lær-an*, to teach, means to teach oneself, *i. e.*, to learn. As, however, the director of a work often gets the credit due to his subaltern, so the person who directed his pupil to do his work of teaching himself was formerly said — and the usage still exists — to *learn* or *larn* the pupil. In nearly all European languages, this double force of the word is found. Three hundred years ago even it was unquestionably good English to say, as Cranmer does in his version of the Psalter — "Lead me forth in thy truth and *learn* me," and as Shakespeare does in the person of Caliban — "the red plague rid you for *learning* me your language." But what does the original root *lær* mean? It is evidently equivalent to the Mœso-Gothic *lais* or *les*; *s* being interchangeable with *r*, as we see in the Latin, *arbos*, *arbor* and in the German, *eisen*, compared with our *iron*. But the Mœso-Gothic *lais* or *les* is identical with the German, *les* or *lesen*, and means to *pluck*, *gather*, *acquire*, *read*, *learn*, and we have still a trace of it in our provincial word *leasing* — gleaning or gathering up. The primitive meaning then of the root *lær*, of our original English must have been the same as that of the Mœso-Gothic *lès*, though, for reasons already referred to, the causative sense to *make to gather*, *acquire or learn*, must have been very early superadded. On the whole, then, it appears sufficiently clear that to *learn* is to gather or glean for oneself — *i. e.*, to teach oneself. But the correlative *teach* also requires a moment's consideration. This is derived from, or equivalent to, the original English, *tæc* or *tæch* (in tæc-an or tæch-an), to the German, *zeig* (in *zeigen*), to the Mœso-Gothic *tech* (in *techan*), to the Latin *doc* (in *docere*), or *dic* in di(c)scere (of which the ordinary form is discere) and to the Greek δεικ (in δείκνυμι). This common root means to *show*, *point out*, *direct*, *lead the way*. The same idea is conveyed by the French equivalents *montrer* and *enseigner*, both meaning, as we know, to teach.

The etymology, then, in both instances supports the theory that *learning* is gathering up or acquiring for onself, and *teaching*, the guiding, directing, or superintending of that process.

The pupil, then, by this theory is to advance by his own efforts, to work for himself, to learn for himself, to think for himself; and the teacher's function is to consist mainly in earnest and sympathizing direction. He is to devote his knowledge, intelligence, virtue, and experience to that object. He has himself travelled the road before which he and his young companion are to travel together; he knows its difficulties, and can sympathize with the struggles which must be made against them. He will therefore endeavor to gain his pupil's confidence, by entering into them, and by suggesting adequate motives for exertion when he sees the needful courage failing. He will encourage and animate every honest and manful effort of his pupil, but, remembering that he is to be a *guide* and not a *bearer*, he will not even attempt to supersede that labor and exercise which constitute the value of the discipline to the pupil, which he cannot take upon himself without defeating the very end in view.

It is worth while here to meet a plausible objection which has been taken against this view of the teacher's function. If, it is said, the pupil really after all learns by himself without the intervention of the teacher's mind in the process — though the intervention of his *moral* influence is strenuously insisted on — then this superintendent of other people's efforts to gain knowledge may really have none himself; this director of machinery may know nothing of mechanics. This objection is pertinent and deserves attention. It is obvious that the teacher who is really able to enter into his pupil's difficulties in learning effectively ought to be well furnished with knowledge and experience. Knowledge of the subject under instruction is to be required of the teacher, both because the recognized possession of it gives him weight and influence, and because the possession of a large store of well-digested knowledge is itself distinct evidence that its owner has gone through a course of healthful mental discipline, and is on that ground — other things being equal — a fit and proper person to superintend those who are going through the same discipline. Knowledge also of a special kind he ought to have — that derived from thoughtful study, accompanied by practice, of the machinery which he is to direct. He is not, by the assumption, himself an essential part of it, but as an overlooker or engineer he certainly ought to be acquainted with its nature and construction, so as to be able to estimate its working power, and to know when to start and when to stop it, to prevent both inaction and overaction. A teacher, then, without some knowledge of psychology, gained both systematically and by experience and observation, could hardly be considered as fully equipped for his work. But I need not dwell further on this point, though I could not well leave it unnoticed.

It appears, then, that the teacher of a pupil who teaches himself will find quite enough to do in his work of superintendence and sympathy. It is only as far as the mental process of learning that the pupil is in any sense independent of him.

I do not profess to describe in philosophic terms what the mental process which we call learning really is, but it is necessary for my argument to maintain that whatever it is, it can no more be performed by deputy than eating, drinking, or sleeping, and further, that every one engaged in performing it is really teaching himself. If, then, the views I have suggested of the relation between the teacher and the learner be generally correct, and the latter really learns by teaching himself, it would follow that if we could only ascertain his method as a learner, we should obtain the true elements of ours as teachers; or in other words, that true principles of the art of teaching would be educed from those involved in the art of learning, though the converse is by no means true.

The establishment of these principles would furnish us with a test of the real value of some of the practices in current use amongst teachers, and perhaps help to lay the foundation of that teaching of the future, which will, as I believe, identify self-tuition, under competent guidance, with the scientific method of investigation.

But I must endeavor to enlarge the field of inquiry, and show that self-tuition under guidance is the only possible method in the acquirement of that elementary instruction which is the common property of the whole human race. Long before the teacher, with his apparatus of books, maps, globes, diagrams, and lectures, appears in the field, the child has been pursuing his own education under the direction of a higher teacher than any of those who bear the technical name. He has been learning the facts and phenomena which stand for words and phrases in the great book of Nature, and has also learned some of the conventional signs by which those facts and phenomena are known in his mother-tongue.

As my general proposition is that the art of teaching should be, as far as possible, founded on those processes by which Nature teaches those who have no other teacher — those who learn by themselves — it is important to glance at a few of these processes.

Nature's earliest lessons consist in teaching her pupils the use of their senses. The infant, on first opening his eyes, probably *sees* nothing. A glare of light stimulates the organ of sight, but makes no distinct impression upon it. In a short time, however, the light reflected from the various objects around him impinges with more or less force, upon the eye and impresses upon it the images of things without, the idea of the image is duly transferred to the mind — and thus the first lesson in seeing is given.

This idea of form, is, however, complex in its character, which arises from the fact that the objects presented to his attention are wholes or aggregates. He learns to recognize them in the gross before he knows them in detail. He has no choice but to learn them in this way. No child ever did learn them in any other way. Nature presents him with material objects and facts, or things already made or done. She does not invite him, in the first instance, before he knows in a general way the whole object, to observe the constituent parts, nor the manner in which the parts are related to the whole. She never, in condescension to his weakness of perception, separates the aggregate in its component elements — never presents these elements to his consideration one by one. In short, she ignores altogether in her earliest lessons the synthetical method, and insists on his employing only the analytical. As a student of the analytical method he proceeds with his investigations, observing resemblances and differences, comparing, contrasting, and to some extent generalizing (and thus using the synthetical process), until the main distinctions of external forms are comprehended, and their more important parts recognized as distinct entities, to be subsequently regarded themselves as wholes and decomposed into *their* constituent parts. Thus the child goes on with Nature as his teacher, learning to read for himself and by himself the volume she spreads out before him, mastering first some of its sentences, then its phrases and words, and lastly, a few of its separate letters.

So with regard to the physical properties of objects as distinguished from their mechanical divisions or parts. What teacher but Nature makes the child an embryo experimental philosopher? It is she who teaches him to teach himself the difference between hard and soft, bitter and sweet, hot and cold. He lays hold of objects within his reach, conveys them to his mouth, knocks them against the table or floor, and by performing such experiments incessantly gratifies, instructs, and trains the senses of sight, touch, taste, smelling, and hearing. At one time a bright and most attractive object is close at hand. It looks beautiful, and he wonders what it can be. Nature whispers, "Find out what it is. Touch it." He puts his fingers obediently into the flame, burns them, and thus makes an experiment, and gains at the same time an important experience in the art of living. He does not, however, feel quite certain that this may not be a special case of bad luck. He therefore tries again, and of course with the same result. And now, reflecting maturely on what has taken place, he begins to assume that not only the flame already tried, but all flames will burn him — and thus dimly perceiving the relation between cause and effect, he is already tracking, though slowly and feebly, the footsteps of the inductive philosophy. Even earlier in life — as soon, indeed, as he was born, as Professor Tyndall remarks — urged by the necessity of doing something for his living, he improvised a suction-pump, and thus showed himself to be, even from his birth, a student of practical science.

These instances will serve to show that Nature's earliest lessons are illustrations of the theory, that teaching essentially consists in aiding the pupil to teach himself. The child's method of learning is evidently self-tuition under guidance, and nothing else. He learns, *i. e.*, gathers up, acquires, knows a vast number of facts relating to things about him; and, moreover, by imitation solely, he gains a practical acquaintance with the arts of walking, seeing, hearing, &c. Who has taught him? Nature — himself — practically they are one. In the ordinary sense, indeed, of the word teaching, Nature has not taught him at all. She has given him no rules, no laws, no abstract principles, no formulæ, no grammar of hearing, seeing, walking, or talking; she simply gave the faculty, supplied the material, and the occasion for its exercise, and her pupil learnt to do *by doing*. This is what Nature, the teacher, the guide, the directrix, did. But something more she did, or rather in her wisdom left undone. When her pupil, through carelessness and heedlessness, failed to see what was before him, when he blundered in his walking or talking, she neither interposed to correct his blunders, nor indulged in outcries and objurgations against him. She bided her opportunity. She went on teaching, he went on learning, and the blunders were in time corrected by the pupil himself. Even when he was about to burn his fingers, it was no part of her plan to hinder him from learning the valuable lessons taught by the ministry of pain. Perhaps in these respects, as well as in so many others, teachers of children might learn something from the example of their great Archididascalos.

But it will be objected that Nature's wise, authoritative teaching can be no guide for us. She teaches by the law of exigency, and her pupil must perforce learn whether he will or not. In the society in which we live there is no such imperative claim, and the teacher, who appears as Nature's deputy, can neither wield her authority nor adopt her methods. In reply to this objection it may be urged that Society's claims upon her members are scarcely less imperative than Nature's, and that the deputy can, and ought to, act out his superior's principles of administration.

Suppose then, for instance, that Society requires that a child should learn to read. In this case, certainly, Nature will not intervene to secure that special instruction, but the method adopted by her deputy may be, and ought to be, founded on hers. Every principle of Nature's teaching is violated in the ordinary plan of commencing with the alphabet. Nature, as I have already said or implied, sets no alphabet whatever before her pupil; nor is there in the teaching of Nature anything that even suggests such a notion as learning A, B, C. Nature's teaching, it cannot be too frequently repeated, is, at first analytical, *not* synthetical, and the essence of it is that the pupil makes the analysis himself.

Our ordinary teacher, however, in defiance of Nature, commences his instructions in the art of reading with A, B, C, pointing out each letter, and at the same time uttering a sound which the child is expected to consider as the sound always to be associated with that sign. At length, after many a groan, the alphabet is learned perfectly and the teacher proceeds to the combinations. He points to a word, and the pupil says, letter by letter, *bee-a-tee*, and then, naturally enough, comes to a dead stop. His work is done. Neither he nor Sir Isaac Newton in his prime, could take the next unexpected step and compound these elements into *bat.*

The sphynx who proposes the riddle may indeed look menacingly for the answer, but by no possible chance can she get it. The teacher then comes to the rescue, utters the sound *bat*, which the child duly repeats, and thus the second stage in reading is accomplished.

It will be observed that the only rational and sensible feature in this process is the utterance and echo of the sound *bat* in view of the word or sign, and if the teacher had begun with this, and not confused the child by giving him the notion that he was learning a *sound*, when he was in fact learning nothing but a *name*, Nature would have approved of the lesson, as analagous to those given by herself. She might also have asked the teacher to notice that the child learns to speak by hearing and using whole words. Nobody addresses him as *bee-a-bee-wy*, nor does he say *em-a-em-em-a*. He, in fact, deals with aggregates, compares them together, exercises the analytical faculty upon them, and employs the constituent elements which he thus obtains in ever new combinations There can be no doubt, then, that the child learns to speak, by imitation, analysis, and practice. Why not, then, says Nature, let him learn reading in the same way? Let him in view of entire words echo the sound of them received from the teacher; let him learn them thoroughly as wholes, let him by analysis separate them into their syllables, and the syllables into their letters, and it will be found that the phonic faculty of the compound leads surely and easily to that of its separate parts. The fact that our orthography is singularly anomalous is an argument for, rather than against, the adoption of this plan of teaching to read.

In pursuing this only natural method of instruction we notice that the pupil frequently repeats the same process, going over and over the same ground until he has mastered it, and as in learning to walk he often stumbled before he walked freely, and in learning to talk often blundered and stammered before he used his tongue readily, so while learning to read in Nature's school, he will make many a fruitless attempt, be often puzzled, often for awhile miss his path, yet all the while he is correcting his errors by added knowledge and experience, sharpening his faculties by practice, teaching himself by his own active efforts, and not receiving passively the explanations of others; deeply interested too in discovering for himself that which he would be even disgusted with if imposed upon by dogmatic authority, he is trained, even from the very beginning, in the method of investigation. I cannot but look upon him as illustrating faithfully and fairly in his practice the theory that learning is self-tuition under competent guidance, and that teaching is, or ought to be, the superintendence of the process.

Did time permit I could give many illustrations of the interest excited, and the efficiency secured, by this method of teaching reading. For example, I have seen and heard children earnestly petitioning to be allowed to pursue their lessons in reading, after a short experience of it, by what they called the "finding out plan." It was known to me more than forty years ago, as a part of Jacotot's once renowned "Enseignement Universel," and I then put it to the severest test. It is also substantially contained in Mr. Curwen's "Look and Say Method," in the little book entitled "Reading without Spelling, or the Scholar's Delight," and in articles by Mr. Dunning and Mr. Baker, of Doncaster, in the *Quarterly Journal of Education* for 1834. A natural method, like others, requires of course to be judiciously directed, and the teacher's especial duty is in this, as in other methods, to maintain the interest of the lesson, and above all, to get the pupil, however young he may be, *to think;* especially as, according to the principles already laid down, it is rather the pupil who *learns* than the master who *teaches*. As a case in point I quote a passage from the life of Lord Byron. Speaking of a school he was in when five years of age, he says, "I learned little there except to repeat by rote the first lesson of monosyllables, 'God made man, let us love him, &c.,' by hearing it often repeated without acquiring a letter. Whenever proof was made of my progress at home, I repeated these words, with the most rapid fluency, but on turning over a new leaf, I continued to repeat them, so that the narrow boundaries of my first year's accomplishments were detected, my ears boxed (which they did not deserve, seeing that it was by ear only that I had acquired my letters), and my intellects consigned to a new preceptor." This case, however, proves only that Byron had not been directed in teaching himself, and that he was not a pupil of the analytical method. His mind had taken no cognizance of the acquisitions which he had mechanically made.

Another instance, much more to the point, is supplied in a passage which I extracted many years ago from a Report of the Gaelic School Society, and which contains a most valuable lesson for the teachers of reading. "An elderly female in the parish of Edderton was most anxious to read the Scriptures in her native tongue. She did not even know the alphabet, and of course she began with the letters. Long and zealously she strove to acquire these, and finally succeeded. She was then put into the syllable class, in which she continued some time, but made so little progress that, with a breaking heart, she retired from the school. The clergyman of the parish, on being made acquainted with these circumstances, advised the teacher to send for her again, and instead of trying her with syllables, to which she could attach no meaning, to give her the sixth Psalm at once. This plan succeeded to admiration: and when the school was examined by a committee of presbytery, she read the thirty-seventh Psalm in a manner that astonished all present." Whether this important discovery — for it was nothing less — was made practically available in the teaching of the parish of Edderton I do not know; but I should not be surprised to find that the good old A, B, C, and the cabalistical b-a, ba; b-e, be, — in which Dr. Andrew Bell gravely tells us "the sound is an echo to the *sense!*" — is still going on there as at the beginning.

I have detained you long over the practical illustration contained in the method of teaching to read, because it really is a complete application of the theory which I advocate, and involves such principles as these which I state with the utmost brevity for want of time: —

1. The pupil, teaching himself, begins with tangible and concrete facts which he can comprehend, not with abstract principles which he cannot.
2. He employs a method — the analytical — which lies in his own power, not the synthetical, which mainly requires application *ab extra.*
3. His early career is not therefore impeded by needless precepts, and authoritative dogmas.
4. He learns to become a discoverer and explorer on his own account, and not merely a passive recipient of the results of other people's discoveries.
5. He takes a degree of pleasure in the discoveries or acquisitions made by himself, which he cannot take in those made by others.
6. In teaching himself he proceeds — he can only proceed — in proportion to his strength, and is not perplexed and encumbered by explanations, which, however excellent in themselves, may not be adapted — generally are not adapted — to the actual state of his mind.
7. He consequently proceeds from the known to the unknown.

8. The ideas that he thus gains will, as natural sequences of those already gained by the same method, be clear and precise as far as they go, his knowledge will be accurate, though of course very limited, because it is his own.
9. By teaching himself, and relying on his own powers in a special case, he acquires the faculty of teaching himself generally — a faculty the value of which can hardly be overrated.

If these principles are involved in the method of self-tuition they necessarily define the measure and limit of the teacher's function, and show us what the art of teaching ought to be. They seem also to render it probable that much that goes under the name of teaching rather hinders than helps the self-teaching of the pupil. The assumption of the pupil's inability to learn except through the manifold explanations of the teacher is inconsistent with this theory, nor less so is the universal practice of making technical definitions, abstract principles, scientific rules, &c., form so large a portion of the pabulum of the youthful mind. The superintending teacher by no means however despises definitions, principles and rules, but he introduces them when the pupil is prepared for them, and then he gets him to frame them for himself. The self-teaching student has no power to anticipate the time when these deductions from facts — for such they all ultimately are — will, by the natural course of mental development, take their proper place in the course of instruction, and any attempt to force him to swallow them merely as intellectual boluses prematurely can only end in derangement of the digestive organs. His mind *can* digest, or at least begin to digest, facts which he sees for himself, but not definitions and rules which he has had no share in making. He cannot, in the nature of things, assume the conclusions of others drawn from facts of which he is ignorant as *his* conclusions, and he is not therefore really instructed by passively receiving them.

Those who take a different view from this of teaching sometimes plead that inasmuch as rules and principles are compendious expressions representing many facts, the pupil does in learning them economize time and labor. Experience does not, however, support this view, but it is rather against it. The elementary pupil cannot, if he would, comprehend for instance the metaphysical distinctions and definitions of grammar. They are utterly unsuited for his stage of development, and if violently intruded into his mind they cannot be assimilated to its substance, but must remain there as crude, undigested matter until the system is prepared for them. When that time arrives, he will welcome these compendious generalizations of facts which when prematurely offered he rejected with disgust. Stuffing a pupil with ready-made rules and formulæ may perhaps make an adept in cramming, but is cramming the be-all and end-all of education?

But I must furl my sails and make for land. The idea which I have endeavored to give of the true relation of the pupil to the teacher, and which represents the former as carrying on his own self-tuition under the wise superintendence of the latter, is of course not new. Nothing strictly new can be said about education. The elements of it may easily be found in the principles and practice of Ascham, Montaigne, Ratich, Milton, Comenius, Locke, Rousseau, Pestalozzi, Jacotot, and Herbert Spencer. Those who are interested in the subject may find an account of the views and methods of these eminent men in Mr. Quick's valuable little book on Educational Reformers. All, in fact, who have insisted on the great importance of eliciting the pupil's own efforts and not superseding, enfeebling and deadening them by too much telling and explaining — all, too, who have urged that abstract rules and principles should, in teaching, follow, not precede, the examples on which they are founded, have virtually adopted the theory which I have endeavored to state and illustrate. They have, in substance, admitted that the teacher's function is defined by a true conception of the mental operation which we call learning; and that that operation is radically and essentially the work of the pupil, and cannot be performed for him.

If I have succeeded at all in the development of my theory, it must be obvious that a pupil thus trained must be a more accurate observer, a more skilful investigator, more competent to deal with subjects of thought in an intelligent way; in a word, a more awakened thinker than one trained in accordance with the opposite theory. The process he goes through naturally tends to make him such, and to prepare him to appreciate and adopt in his subsequent career the methods of science. It is the want of that teaching which comes from himself that makes an ordinary pupil the slave of technicalities and routine, that prevents him from grappling with a common problem of arithmetic or algebra unless he happens to remember the rule, and from demonstrating a geometrical proposition if he forgets the diagram; which, even though he may be a scholar of Eton or Harrow, leaves him destitute of power to deal at sight with a passage of an easy Greek or Latin author. In the great bulk of our teaching, with of course many and notable exceptions, the native powers of the pupil are not made the most of; and hence his knowledge, even on leaving school, is too generally a farrago of facts only partially hatched into principles, mingled in unseemly jumble with rules scarcely at all understood, exceptions claiming equal rank with the rules, definitions dislocated from the objects they define, and technicalities which clog rather than facilitate the operations of the mind.

A slight exercise of our memories, and a slight glance at the actual state of things amongst us, will, I believe, witness to the substantial truth of this statement. If, however, we want other testimony, we may find it in abundance in the Reports and evidence of the four Commissions which have investigated the state of education amongst us; if we want more still, we may be supplied — not, I am sorry to say, to our heart's content, but discontent — in the reports of intelligent official observers from abroad. If we want more still, let us read the petitions only lately presented to the House of Commons from the highest medical authorities, who complain that medical education is rendered abortive and impossible by the wholly unsatisfactory results of middle-class teaching. Does it appear unreasonable to suppose that such a chorus of dispraise and dissatisfaction could not be raised unless there were something in the methods of teaching which naturally leads to the results complained of? If the quality of the teaching — I am not considering the quantity — is not responsible for the quality of its results, I really do not know where we are to find the cause, and failing in detecting the cause, how are we to *begin* even our search for the remedy? Theories of teaching which distrust the pupil's native ability, which in one way or other repress, instead of aiding, the natural development of his mind, which surfeit him with technicalities, which impregnate him with vague infructuous notions that are never brought to the birth, that cultivate the lowest faculties at the expense of the highest, that make him a slave of the Rule-of-Thumb instead of a master of principles — are these theories, which have done much of the mischief, to be still relied on to supply the reform we need? Or shall we find, at least, some of the germs of future life in the other theory, which from the first confides in, cherishes, and encourages the native powers of the child, which take care that his acquisitions, however small, shall be made by himself, and secures their possession by repetition and natural association, which invests his career with the vivid interest which belongs to that of a discoverer and explorer of unknown lands, which, in short, to adopt the striking words of Burke, instead of serving up to him barren and lifeless truths, leads him to the stock on which they grew, which sets him on the track of invention, and directs him into those paths in which the great authorities he follows made their own discoveries? Is a theory which involves such principles, and leads to such results, worthy the consideration of those who regard education as pre-eminently the civilizing agent of the world, and lament that England, as a nation, is so little fraught with its spirit?

THE TRUE FOUNDATION OF SCIENCE-TEACHING.

It is almost a truism to say, that the foundation of a building is its most important feature. If the foundation be either insecure in itself, or laid without regard to the plan of the superstructure, the building, as a whole, will be found wanting both in unity and strength. A building is in fact the embodiment and realization of an idea conceived in the mind of the architect, and if he is competent for his post, and can secure the needful co-operation, the practical expression will symmetrically correspond to the conception. But unless the foundation is solidly laid, and all the parts of the building are constructed with relation to it, his æsthetic and theoretic skill will go for little or nothing. His work is doomed to failure from the beginning, and the extent of the failure will be proportionate to the ambition of the design. These remarks are applicable to the art of building generally, whether shown in large and imposing structures, or in the meanest cottages. In no case can the essential elements of unity and strength be dispensed with.

In these preliminary observations I have foreshadowed the subject with which I have to deal—that of Science-teaching — whether carried on under the direction of a Science and Art Department, or in the smallest class of a private school; and my purpose is to ascertain how far the ideal of theory is realized in the general practice.

Whatever might have been said of the neglect of what is called "science" in former times, we cannot make the same complaint now. A ringing chorus of voices may be heard vociferously demanding science for the children of primary, secondary, and public schools; for the Universities; in short, for all classes of society. "Science," it is said, "is the grand desideratum of our age, the true mark of our civilization. We want science to supply a mental discipline unfurnished by the old-estalished curriculum; we want it as the basis of the technical instruction of our workmen."

In answer to this universal demand we see something called Science-teaching finding its way into primary, and even into public schools, in spite of the declaration of an eminent Head-master, not longer back than 1863, that instruction in physical science, in the way in which it could be given in Winchester School, was "worthless;" that a "scientific fact was a fact which produced nothing in a boy's mind;" and that this kind of instruction "gave no power whatever." We further see this something, called Science, stimulated by grants and prizes, through the vast machinery of the Science and Art Department; and lastly we have, at this moment, a Royal Commission of eminent scientific men, taking evidence and furnishing Reports on "Scientific instruction and the advancement of Science." Who, after this, will be bold enough to say that Science is not looking up in the knowledge-market?

But amidst all the clamor of voices demanding instruction in Science, we listen in vain for the authoritative voice — the voice of the master artist — which shall define for us the aims and ends of Science, and lay down the laws of that teaching by which they are to be effectively secured. As things go, every teacher is left to frame his own theory of Science-teaching, and his own empirical method of carrying it out; and the result is, to apply our illustration, that the fabric of Science-teaching now rising before us rests upon no recognized and established foundation, exhibits no principle of harmonious design, and that its various stages have scarcely any relation to each other, and least of all to any solidly compacted ground-plan.

Before I proceed further in the task I have undertaken, I think it wise, certainly politic, to defend myself against the charge which justly attaches to him who ventures to speak with confidence on a subject with which he is not largely and experimentally acquainted.

It may be said with too much truth, that I am in this predicament. I am not, and do not for a moment pretend to be, a man of science. Scientific matters have, it is true, always been intensely interesting to me from the time when, as a schoolboy, I used to stuff a volume of Joyce's Scientific Dialogues into my pocket to read when I ought to have been playing; but I was never trained in the method of Science, nor experienced what I have so often conceived, the intense delight of the scientific investigator.

But though not qualified by scientific knowledge to speak of

Science, I may venture, as a teacher, to say something about teaching; and, as Science-teaching is a compound term, to hope that any ignorance I may display in treating one of the factors, will be pardoned me, if I can bring some few considerations derived from experience in education, to bear upon the other, which is, from my present point of view, the more important.

The only other preliminary remark that I need make is this, that, as our subject is the *foundation* of Science-teaching, I am excused, by the nature of my purpose, from dealing with the higher Science-teaching, presumably built upon that foundation. It is the foundation that, according to my view, requires the most attention.

The first question for consideration is, "What is meant by Science?" The shortest answer that can be given is, that "Science is organized knowledge." This is, however, too general for our present purpose, which is, to deal with Physical Science. In a somewhat developed form, then, physical science is an organized knowledge of material, concrete, objective facts or phenomena. The term "organized," it will be seen, is the essence of the definition, inasmuch as it connotes or implies that certain objective relations subsisting in the nature of things, between facts or phenomena, are subjectively appreciated by the mind — that is, that Science differs from mere knowledge by being a knowledge both of facts, and of their relations to each other. The mere random, haphazard accumulation of facts, then, is not Science; but the perception and conception of their natural relations to each other, the comprehension of these relations under general laws, and the organization of facts and laws into one body, the parts of which are seen to be subservient to each other, *is* Science.

Returning to the other factor of the definition, "Knowledge," we observe that there are two kinds of knowledge — what we know through our own experience, and what we know through the experience of others. Thus, I know by my own knowledge that I have an audience before me, and I know through the knowledge of others that the earth is 25,000 miles in circumference. This latter fact, however, I know in a sense different from that in which I know the former. The one is a part of my experience, of my very being. The other I can only be strictly said to know when I have, by an effort of the mind, passed through the connected chain of facts and reasonings on which the demonstration is founded. Thus only can it become my knowledge in the true sense of the term.

Strictly speaking, then, organized knowledge, or Science, is originally based on unorganized knowledge, and is the outcome of the learner's own observation of facts through the exercise of his own senses, and his own reflection upon what he has observed. This knowledge, ultimately organized into Science through the operation of his mind, he may with just right call his own; and, as a learner, he can properly call no other knowledge his own. What is reported to us by another is that other's, if gained at first-hand by experience; but it stands on a different footing from that which we have gained by our own experience. He merely hands it over to us; but when we receive it, its condition is already changed. It wants the brightness, definiteness, and certainty in our eyes, which it had in his; and, moreover, it is merely a loan, and not our property. The fact, for instance, about the earth's circumference was to him a living fact; it sprang into being as the outcome of experiments and reasonings, with the entire chain of which it was seen by him to be intimately — indeed indissolubly and organically connected. To us it is a dead fact, severed from its connection with the body of truth, and, by our hypothesis, having no organic relation to the living truths we have gained by our own minds. These are convertible into our Science; that is not. What I insist on then is, that the knowledge from experience — that which is gained by bringing our own minds into direct contact with matter — is the only knowledge that as novices in science we have to do with. The dogmatic knowledge imposed on us by authority, though originally gained by the same means, is, really, not ours, but another's — is, as far as we are concerned, unorganizable; and therefore, though Science to its proprietor, is not Science to us. To us it is merely information, or haphazard knowledge.

The conclusions, then, at which we arrive, are — (1) That the true foundation of physical Science lies in the knowledge of physical facts gained at first-hand by observation and experiment, to be made by the learner himself; (2) that all knowledge not thus gained is, *pro tanto*, unorganizable, and not suited to his actual condition; and (3) that his facts become organized into Science by the operation of his own mind upon them.

Having given some idea of what is meant by Science, and how it grows up in the mind of the learner, I turn now to the teacher, and briefly inquire what is his function in the process of Science-teaching?

I have elsewhere* endeavored to expound the correlation of learning and teaching, and to show that the natural process of investigation by which the unassisted student — unassisted, that is by book or teacher, — would seek, as a first discoverer, to gain an accurate knowledge of facts and their interpretation, suggests to us both the nature and scope of the teacher's, and especially the Science-teacher's, functions. According to this view of the subject, the learner's method, and the teacher's, serve as a mutual limit to each other. The learner is a discoverer or investigator engaged in interrogating the concrete matter before him, with a view to ascertain its nature and properties: and the teacher is a superintendent or director of the learner's process, pointing out the problem to be solved, concentrating the learner's attention upon it, varying the points of view, suggesting experiments, inquiring what they result in; converting even errors and mistakes into means of increased power, bringing back the old to interpret the new, the known to interpret the unknown, requiring an exact record of results arrived at — in short, exercising all the powers of the learner's mind upon the matter in hand, in order to make him an accurate observer and experimenter, and to train him in the method of investigation.

The teacher, then, is to be governed in his teaching, not by independent notions of his own, but by considerations inherent in the natural process by which the pupil learns. He is not, therefore, at liberty to ignore this natural process, which essentially involves the observation, experiment, and reflection of the pupil; nor to supersede it by intruding the results of the observation, experiment, and reflection of others. He is, on the contrary, bound to recognize these operations of his pupil's mind as the *true foundation of the Science-teaching* which he professes to carry out. In other words, the process of the learner is the true foundation of that of the teacher.

This sketch would be sufficient were it merely my object to present a theory. But as I am seriously in earnest, and wish to see the claims of Science vindicated, and the teaching of its facts, principles, and laws placed on a totally different ground from that which it now generally occupies, I must pursue the subject further.

It will have been observed, that I lay great stress on teaching

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* See a Lecture entitled "Theories of Teaching with the corresponding Practice," delivered April 26, 1869, at the Rooms of the Association for the Promotion of Social Science.

Science in such a way that it shall become a real training of the student in the method of Science, with a view to the forming of the scientific mind. According to the usual methods of Science-teaching, it is quite possible for a student to "get up," by cramming, a number of books on scientific subjects, to attend lecture after lecture on the same subjects, to be drenched with endless explanations and comments on descriptions of experiments performed by others, to lodge in his memory the technical results of investigations in which he has taken no part himself, together with formulæ, rules, and definitions *ad infinitum*, and yet, after all, never to have even caught a glimpse of the idea involved in investigation, or to have been for a moment animated by the spirit of the scientific explorer. That spirit is a spirit of power, which, not content with the achievements gained by others, seeks to make conquests of its own, and therefore examines, explores, discovers, and invents for itself. These are the manifestations of the spirit of investigation, and that spirit may be excited by the true Science-teacher in the heart of a little child. I may refer, for proof of this assertion, to the teaching of botany to poor village children by the late Professor Henslow; to the teaching of general Science by the late Dean Dawes to a similar class of children; to that pursued at the present time at the Bristol Trade School; and to the invaluable lessons given to the imaginary Harry and Lucy by Miss Edgeworth. Without warranting every process adopted by these eminently successful teachers, some of whom were perhaps a little too much addicted to explaining, I have no hesitation in declaring that they one and all acted mainly on the principle that true Science-teaching consists in bringing the pupil's mind into direct contact with facts — in getting him to investigate, discover, and invent for himself. The same method is recommended in Miss Youmans' philosophical Essay "On the Culture of the Observing powers of children,"* and rigorously applied in her "First Lessons on Botany;" and in the Supplement to that little volume I have given, as its editor, a typical lesson on the pile-driving engine, which illustrates the following principles: —

1. That the pupils, throughout the lesson, are learning — *i. e.*, teaching themselves, by the exercise of their own minds, without, and not by, the explanations of the teacher.

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* "An Essay on the Culture of the Observing Powers of Children, especially in connection with the Study of Botany. By Eliza A. Youmans, of New York, with Notes and a Supplement by Joseph Payne." Henry S. King & Co., Cornhill, 1872.

2. That the pupils gain their knowledge from the object itself, not from a description of the object furnished by another.

3. That the observations and experiments are their own observations and experiments, made by their own senses and by their own hands, as investigators seeking to ascertain for themselves what the object before them is, and what it is capable of doing.

4. That the teacher recognizes his proper function as that of a guide or director of the pupil's process of self-teaching, which he aids by moral means, but does not supersede by the intervention of his own knowledge.

These hints all tend to show what is really meant by Science-teaching, as generally distinguished from other teaching.

In case, however, my competency to give an opinion on Science-teaching should be questioned, I beg to enforce my views by the authority of Professor Huxley, who, in a lecture on "Scientific Education," thus expresses himself: — "If scientific training is to yield its most eminent results, it must be made practical — that is to say, in explaining to a child the general phenomena of nature, you must, as far as possible, give reality to your teaching by object-lessons. In teaching him botany, he must handle the plants and dissect the flowers for himself; in teaching him physics and chemistry, you must not be solicitous to fill him with information, but you must be careful that what he learns he knows of his own knowledge. Do not be satisfied with telling him that a magnet attracts iron. Let him see that it does; let him feel the pull of the one upon the other for himself. . . . Pursue this discipline carefully and conscientiously, and you may make sure that, however scanty may be the measure of information which you have poured into the boy's mind, you have created an intellectual habit of priceless value in practical life."

Again, in the same lecture, the Professor says, — "If the great benefits of scientific training are sought, it is essential that such training should be real — that is to say that the mind of the scholar should be brought into direct relation with fact; that he should not merely be told a thing, but made to see, by the use of his own intellect and ability, that the thing is *so*, and not otherwise. The great peculiarity of scientific training — that in virtue of which it cannot be replaced by any other discipline whatever — is this bringing of the mind directly into contact with fact, and practising the mind in the completest form of induction — that is to say, in drawing conclusions from particular facts made known by immediate observations of Nature."

To the same effect another eminent Science-teacher, Mr. Wilson, of Rugby School, thus expresses himself. "Theory and experience," he says, "alike convince me that the master who is teaching a class quite unfamiliar with scientific method, ought to make his class teach themselves, by thinking out the subject of the lecture with them, taking up their suggestions and illustrations, criticising them, hunting them down, and proving a suggestion barren or an illustration inapt; starting them on a fresh scent when they are at fault, reminding them of some familiar fact they had overlooked, and so eliciting out of the chaos of vague notions that are afloat on the matter in hand, be it the laws of motion, the evaporation of water, or the origin of the drift, something of order, concatenation, and interest, before the key to the mystery is given, even if, at all, it has to be given. Training to think, not to be a mechanic or a surveyor, must be first and foremost as his object. So valuable are the subjects intrinsically, and such excellent models do they provide, that the most stupid and didactic teaching will not be useless; but it will not be the same source of power that the method of investigation will be in the hands of a good master."

My last quotation will be from the very valuable lecture given here by Dr. Kemshead, the able Science-teacher of Dulwich College, on "The Importance of Physical Science as a branch of English General Education." Referring to education generally, he says, and I entirely agree with him, — "I wish it particularly to be borne in mind that, whenever I use the word education, I use it in its highest and truest sense of training and developing the mind. I hold the acquisition of mere useful knowledge, however important and valuable it may be, to be entirely secondary and subsidiary. I consider it to be of more value to teach the young mind to think out one original problem, to draw one correct conclusion for itself, than to have acquired the whole of 'Mangnall's Questions' or 'Brewer's Guide to Sciencc.'" There speaks the true teacher. But what does he say on Science-teaching? This: — "I wish particularly to draw the distinction between mere scientific knowledge and scientific training. I do not believe in the former; I do believe in the latter. In physical and experimental science, studied for the sake of training, the mode of teaching is everything. I know of one school [we shall soon see that there are many such] in which physical science is made a strong point in the prospectus, where chemistry is taught by reading a text-book (a very antiquated one, since it only gives forty-five elements), but in which the experiments are learnt by heart, and never seen practically. Such a proceeding is a mere farce on Science." But Dr. Kemshead proceeds, — "Of course, as mere useful knowledge, Lardner's hand-books, or any other good text-books, might be committed to memory. So long as the facts are correct, and are put in a manner that the pupil can receive them, the end is gained; but this is not scientific teaching — cramming if you like, but not teaching. It will I am sure, be manifest to you all that there is nothing of scientific training in this. To develop scientific habits of thought — the scientific mind, the teaching must be of a totally different nature. In order to get the fullest benefit from a scientific education, the teacher should endeavor to bring his pupil face to face with the great problems of Nature, as though he were the first discoverer. He should encourage him from the first to record accurately all his experiments, the object he had in view in making them, the results even when they have failed, and the inferences which he draws in each case, with as much rigor and exactitude as though they were to be published in the 'Philosophical Transactions.' He should, in fact, teach his pupil to face the great problems of Nature as though they had never been solved before."

"To face the great problems of Nature as though they had never been solved before" — "to bring the child face to face with the great problems of Nature, as though he were the first discoverer" — these weighty, pregnant, and luminous expressions contain the essence of the whole question I have endeavored to set before you. They define, as you easily perceive, the attitude of the pupil in regard to his subjective process of learning, and the function of the teacher in regard to his objective process of teaching — the one being the counterpart of the other.

It will have been noticed, perhaps, that nothing has been said of text-books, which some consider as "the true foundation of Science-teaching." The reason of this omission lies in the nature of things. The books of a true student of physical Science are the associated facts and phenomena of Nature. He finds them in "the running brooks," the mountains, trees, and rocks; wherever, in short, he is brought face to face with facts and phenomena; these are the pages, whose sentences, phrases, words, and letters he is to decipher and interpret by his own investigation. The intervention of a text-book, so called, between the student and the matter he is to study, is an impertinence. For what is such a text-book? A compendium of observations and experiments made by others in view of that very nature-book which, by the hypothesis, he is to study at first-hand for himself, and of definitions, rules, generalizations, and classifications which he is, through the active powers of his mind, to make for himself. The student's own method of study is the true method of Science. He is being gradually initiated in the processes by which both knowledge, truly his own, and the power of gaining more, are secured. Why should we supersede and neutralize his energies, and altogether disorganize his plan by requiring him to receive on authority the results of other people's labors in the same field? Again, a text-book on Science is a logically-constructed treatise, in which the propositions last arrived at by the author are presented first — in the reverse order to that followed by the method of Science. The sufficient test of the use of books in Science-teaching, is, in fact, this: Do they train the mind to scientific method? If they do not — if on the contrary, they discountenance that method, — then they are to be rejected in that elementary work — the *foundation* of Science-teaching — with which alone we are here concerned. Once more, I appeal to Prof. Huxley, who tells us that, "If Scientific education is to be dealt with as mere book-work, it will be better not to attempt it, but to stick to the Latin Grammar, which makes no pretense to be anything but book-work." Again, in his Lecture to Teachers, — "But let me entreat you to remember my last words. Mere book learning in physical Science is a sham and a delusion. What you teach, unless you wish to be impostors, that you must first know; and real knowledge in Science means personal acquaintance with the facts, be they few or many?" But I must add to these authoritative words those of Dr. Acland, who, when asked by the Public Schools Commission his opinion of the London University Examinations in Physical Science, thus replied: — "I may say, generally, that I should value all knowledge of these physical sciences very little indeed unless it was otherwise than book-work. If it is merely a question of getting up certain books, and being able to answer certain book questions that is merely an exercise of the memory of a very useless kind. The great object, though not the sole object, of this training should be to get the boys to observe and understand the action of matter in some department or another. . . . I want them to see and know the things, and in that way they will evoke many qualities of the mind, which the study of these subjects is intended to develop." (vol. iv. p. 407). These words sufficiently show both what the true foundation is, and what it is not. Once more — for the importance of this matter can hardly be too much insisted on — hear what Prof. Huxley says, in his evidence before the Commission on Scientific Instruction (p. 23) : — "The great blunder that our people make, I think, is attempting to teach from books; our schoolmasters have largely been taught from books and nothing but books, and a great many of them understand nothing but book-teaching, as far as I can see. The consequence is, that when they attempt to deal with Scientific teaching, they make nothing of it. If you are setting to work to teach a child Science, you must teach it through its eyes, and its hands, and its senses."

Having now obtained some notion of the true foundation of Science-teaching, we proceed to inquire where, and by whom, this notion of it is carried out? At this point our ears are saluted by a thousand voices, crying out, "Here — here Science is taught! This — this is the place you are seeking!" We follow the voices, and find, in a multitude of cases, that the thing called Science-teaching has no feature in common with that of which we are in search. We find cramming by text-books, cramming by lectures, experimenting done for, and not by, the students, &c.; and only here and there do we find Science-teaching pursued by the method of investigation — the only method by which, according to the best authorities, it can be pursued so as to gain really valuable results — results worthy of the high dignity of the subject. But in the midst of our bewilderment, we hear the loud voices of the Science and Art Department declaring, authoritatively, that they can show us what we are seeking for. "Look," they say, "at our 800 or 900 Science schools and classes; examine carefully our 38,000 pupils; see the liberal grants and the numerous prizes that we give every year to reward the teachers and the cultivators of Science. What we are doing for Science is wonderful. Have we not twenty-three Sciences in our curriculum, and twenty-three eminent professional examiners to ascertain that they are well learnt and taught?" Our spirit rises to enthusiasm at these tidings. We long to enter the schools, and observe the studies of the 38,000 pupils, all presumably pursuing the true method of investigation under teachers who understand it, and all, in their different stages of advancement, gradually acquiring the scientific mind. Seeing, moreover, the great name of Prof. Huxley in the list of examiners, and knowing what his often-expressed notions on Science-teaching are, we look forward with delight to the exemplification of it in the Science schools and classes. Before, however, we enter on our personal inquiry, we turn to the Directory of the Science Department, to discover the views of the Department on the theory of Science-teaching, or at least a definition of Science which may serve as a guide to the practical operations of those who are engaged in carrying out its views. Not one word, however, do we find to enlighten us on this essential point, nor a single hint as to the true method of Science-teaching. All that we ascertain at our first glance is, that Science — is Science. Our enthusiasm is somewhat damped; but on looking a little more closely, we come upon the formidable array of twenty-three Sciences, which the Department takes under its charge, or for "promoting instruction" in which it gives "grants" as a "stimulus to the founding and maintenance of Science schools and classes." We fail, however, to find in the Directory what we wish to know about the spirit of the teaching; whether it is such as to realize "the great benefits" of which Prof. Huxley speaks; such as to "ensure real knowledge and practical discipline;" such as "to bring the mind directly into contact with facts;" such as "to practise the mind in the completest form of induction." We turn, therefore, to the Examination questions published by the Department, not doubting to detect in the nature of the questions the character of the instruction given; the proof, in short, that this instruction has been "real and practical," and that the questions are intended to ascertain "what the learner knows of his own knowledge," as Prof. Huxley pithily phrases it. After poring, however, over the ninety-one pages of Examination papers, the only question that can be found which seems to answer the requirement that the learner is to describe "what he knows of his own knowledge," is one of Prof. Huxley's. Here it is — "How are sniffing and sneezing effected?" This seems to point to practical experience — but even here there is some room for doubt.

The suspicions, then, that we entertained when we found that the Science Department omitted to furnish a theory or definition of Science to work up to, and any hint respecting the true method of teaching it, are confirmed by an examination of the questions themselves, and we come to the inevitable conclusion that the whole scheme for promoting Science is neither more nor less than a scheme for promoting the cramming up of scientific text-books, for stimulating that "mere book-work" which, we have just been told, is so useless for the purposes of Science, that we had better "stick to the Latin Grammar" than attempt to acquire it that way. Still we can hardly believe that great authorities on education like "My

Lords" can fancy that they are effectually promoting the interests of Science by paying for results gained by this "mere book-work," which practically neutralizes all "the great benefits" to be gained by true scientific training. All doubt on this point is however, removed when we find page after page of the Directory filled up with the titles of books which are, on the recommendation of "My Lords," to help to defeat the very conception of scientific teaching.

But we may inquire for a moment, How does this scheme act on the future interests of Science as far as teachers are concerned? In this way. As soon as a young man has crammed up a subject from his text-book, he presents himself for examination. He passes, and receives a certificate; and then, though he may never have made a single independent observation or experiment, may never have caught even a glimpse of scientific method, and may be utterly without the valuable mental discipline which Prof. Huxley tells us cannot be replaced by any other, he is *ipso facto* qualified and accredited to teach Science, and to earn payments on the results of his so-called teaching.

I do not for a moment deny that much is to be gained from the study of scientific text-books. It would be absurd to do so. What I do deny is that the reading up of books on Science — which is, strictly speaking, a literary study — either is, or can possibly be, a training in scientific method. To receive facts in Science on any other authority than that of the facts themselves; to get up the observations, experiments and comments of others, instead of observing, experimenting, and commenting ourselves; to learn definitions, rules, abstract propositions, technicalities, before we personally deal with the facts which lead up to them; all this, whether in literary or scientific education — and especially in the latter — is of the essence of cramming, and is therefore entirely opposed to, and destructive of, true mental training and discipline.

Therefore it is that I see with regret the vast machinery of the Science Department — which, were it reconstructed and reorganized, might do so much for Science — doing in effect so little — so little, that is, in proportion to its powers and opportunities — to help in laying the true foundation of Science-teaching.

This question of Science-teaching is, in fact, the question of all education, and the process of reconstruction must be applied to the Education Department as well as to the Science Department. As things stand, these departments are perhaps the most powerful promoters of mechanical drill and cram that the world ever knew. Hence the deplorable results of the Revised Code, — one child only in sixty-three throughout the primary schools of the country being able to pass the 6th Standard: and hence, too, the scarcely less deplorable result in the case of Science, that that special mental training — that method of investigation which constitutes its glory, is set aside and treated as worthless.

It is pleasant, however, to see that light is springing up. There is, as I have said, a Royal Commission on Scientific Instruction and the Advancement of Science, now sitting. In their second Report, published a short time ago, occur these words in reference to their opinion that instruction in physical Science ought to be a part of the curriculum of primary schools. "The instruction," they say, "to which we refer, though scientific in substance, should in form be devoid of needless technicality, and should be almost wholly confined to such facts as can be brought under the direct observation of the scholar. It should, in fact, be conveyed by object lessons, so arranged and methodized as to give an intelligent idea of those more prominent phenomena which lie around every child, and which he is apt to pass without notice."

This is quite to the point, and, if carried out in a proper way, will do much to vindicate the neglected claims of Science. Yet even in this Report it is strange to notice the imperfect appreciation of the central principle of the whole — the spirit and method of the teaching. The Commissioners do, indeed, say that, to render this instruction successful, the teachers must have been "carefully trained in the special methods of teaching Science;" but they give no hint as to what these special methods are — whether their speciality consists in cramming up a book, or in learning from Nature and fact. There ought to be no room for mistake on a point like this. Both these processes go now by the name of Science-teaching. Even Dr. Carpenter, who tells us truly that "it is the essence [mark the word] of scientific training that the mind finds the object of its study in the external world;" also claims credit, five minutes before, for the work of the University of London, which simply consists in examining those whose minds "find the objects of their study" in the pages of a book; who, to use the words of Agassiz, "study Nature in the house, and when they go out of doors cannot find her." Now, I maintain that the two teachings — if both must be called by the same name — are diametrically opposed in spirit, in aim, in *modus operandi*, in results;

and that he who loves the one must hate the other. In that serene atmosphere of Science in which the eminent Commissioners continually dwell, of course no such feeling as " hate " is possible; but I do wish they had told us in unmistakeable language what they mean by the special teaching of Science, and where we can see it exemplified. It is clear enough that such teaching is by no means universal: for we find the Commissioners, after having had the Examiners of the Science Department before them, declaring to the world that these Examiners are " under the impression that a *very large part* of the instruction *is derived from books;* and that it is not often illustrated by specimens or experiments, the use of apparatus, or the out-door study of Nature." After rejecting (in 1870) 15,723 papers out of 34,413, the Examiners certainly had some grounds for their impressions (impressions which might have been anticipated from the nature of the case); but the remarkable point — the amusing point in the whole business, is this, that the Commissioners appear to be surprised at these results of the Science Department system. Surely they had never looked into the Directory, nor observed that the essence of that system is the cramming of book-work; that long lists of books suitable for the purpose are given, and not a single hint thrown out that the teaching is to be practical or disciplinary, or to have any connection whatever with Nature and fact. The fruits, then, are the proper fruits of the tree; they could hardly have been other than they are; and it is perhaps a little inconsiderate on the part of the Commissioners to reproach, even in this delicate way, the Science-teaching system which " My Lords," in their wisdom, have sanctioned and promoted. One hopes, of course, that " My Lords " will not be so imprudent as to reply that the failures have arisen from the bad getting up of the books; and yet one can hardly see any other reply from them possible. If, however, this should be the reply, the rejoinder that I venture to make for the Commissioners is this, — " Education means, and is, development and training. Development and training of the mind come from its own exercise, through observation and experiment at first-hand upon Nature and fact. If for this primary study of Nature and fact you substitute the study of other people's studies of these same subjects, you necessitate cram; and Nature ordains that by cram you shall perish — *i. e.*, that by aiming simply at *quantity* of results, without regard to *quality*, you shall end in getting neither quantity nor quality." The experiment as to primary education is of the same kind, and its miserable results bear witness to the fundamental error on which both are founded.

In reading over the evidence taken by the Commissioners, one is struck by the apparent indifference to this very important question of the teaching on the part of scientific men of all kinds. Drs. Acland, Frankland, Sharpey, and Huxley stand almost alone among the Professors; and Mr. Louis Miall and Mr. Coomber almost alone among the Science-teachers, in claiming for Science that it should be worthily, *i. e.*, soundly and practically, taught. Mr. Miall particularly objects to the Science Department's scheme. He says, — "The regulations of the Department do not encourage what I should call a real style of teaching. Teaching of scientific subjects, which ought, as I imagine, to be of a highly practical character, is very largely conducted by such means as reading out slowly notes to be taken down verbatim and committed to memory; or again, by a large use of elementary text-books, which are made as condensed as possible, and are in many cases almost learnt off by heart by frequent repetition." Admirable mental discipline! — a singular exemplification of the way in which the scientific mind is formed! After this we are not surprised to find Mr. Miall (who is, I am told, highly qualified by experience and knowledge to pronounce an opinion) declaring: "If the Science classes in connection with the Department [he is speaking particularly of Bradford] were to go on for fifty years as they are doing at present, I do not think they would produce any perceptible effect upon the industrial occupations" — that being the object they have professedly in view.

As some set off against the strictures I have passed on the Science Department arrangements, it ought to be mentioned that the provisions made for giving practical instruction every year to those teachers who come up to London for the purpose are most excellent. Six weeks of such training is worth more than book-work cramming for twelve months, especially if the teachers are Professors Huxley and Carey Foster and Mr. Ray Lankester.

Had there been time, I would have given some account of Weinhold's Treatise on Physics ("Vorschule der Experimentalphysik"), in which the subject is built up under the observing eyes and experimenting hands of the students; and a little elementary book on Heat by Mr. MacGill (published by Nelson & Co.), in which Science is treated as a means of training, and the difference practically shown between "knowledge gained and used, and knowledge merely given."

I must, however, conclude by urging upon your attention the serious nature of the question I have discussed. If I have succeeded not only in making clear the true foundation of Science-teaching, but in producing convictions in your minds which may lead to action, I shall have accomplished my purpose.

APPENDIX.

I. — EXTRACTS FROM REPLIES TO QUESTIONS PUT BY DIRECTION OF THE DUKE OF DEVONSHIRE, AS CHAIRMAN OF THE ROYAL COMMISSION ON SCIENTIFIC INSTRUCTION, TO THE PROFESSIONAL EXAMINERS OF THE SCIENCE DEPARTMENT.

The questions were —

1. What is the evidence afforded as to the practical nature of the teaching?
2. What opinion have you formed as to the amount of "cram," and the power of testing it by examination?
3. What test is afforded, by passing in the advanced papers, as to the fitness of a candidate to become a teacher?

REPLIES.

3. "In consequence of the plain evidences of the 'cram' system pursued which are afforded by the results that have passed through my hands, I beg leave to give my unqualified opinion that no student who has obtained, even a first class, in either first or second grade, should be allowed, on the strength of that success only, to constitute himself a teacher of others." — F. A. BRADLEY, *Examiner in Practical Plane and Solid Geometry.*

2. "The amount of 'cram' is considerable in some subjects, such as Geometry and the introductory part of Trigonometry. In the former subject it is an undoubted fact that *Euclid is learned by heart* in many schools." — B. M. COWIE, *Examiner in Pure Mathematics.*

2. "By 'cram' in Mathematics I understand the loading of the memory with verbal answers to anticipated questions, and with rules and demonstrations which the understanding has not fathomed. This vicious habit undoubtedly prevails to a deplorable degree. It is the natural offspring of competitive examination, the invariable resource of the incompetent and indolent, who covet, but do not deserve, the worldly advantages which success in examinations secures." — T. A. HIRST, *Examiner in the Higher Pure Mathematics.*

3. "A teacher ought to be able to pass an examination in the higher branches of the subject he professes to teach. This, however, is a very insufficient test indeed of his fitness to teach. Other qualities, moral and intellectual, are required in a teacher, the presence or absence of which written examinations cannot in the least reveal." — *Idem.*

2. "There is undoubtedly a considerable amount of 'cram.' I judge of this by the set phrases by which, in some classes, certain questions are answered." — ANDREW C. RAMSAY, *Examiner in Geology.*

3. "Persons who 'go in' for this office [of teacher] are often very ill qualified for it. It seems to me that often the fact that they are ignorant and ill educated is the reason why they consider themselves likely to be qualified for the office of teacher." — *Idem.*

1. "The papers do not afford any strong evidence of the teaching having been practical. . . . As a whole the teaching must still be regarded as chiefly book-work." — Dr. RUTHERFORD, Dr. MICHAEL FOSTER, *Examiners for* Professor HUXLEY *in Physiology.*

2. "There is abundant evidence every year of cramming." — *Idem.*

2. "I am of opinion that there is a large amount of cram, and *bad* cram too." — JOHN PERCY, *Examiner in Metallurgy.*

II. — EXTRACTS FROM THE EVIDENCE GIVEN BEFORE THE ROYAL COMMISSION.

Mr. HENRY COLE. — Mr. Cole is of opinion (Question 32, Second Report of the Royal Commission) that "a preliminary examination [of the teacher's qualifications] is not of much importance;" and at the same time (Question 43) that a training school for teachers "is the one thing that is especially wanting at the present time;" inasmuch as (Question 83) "the acquisition of general knowledge, and the power of efficiently imparting it, are two different things."

Professor HUXLEY, in opposition to Mr. Cole (Question 273), would "like to see all the teachers put through a special examination."

Dr. RAMSAY (Question 569) says: — "It appears to me that some of the teachers . . . are apt to get up their knowledge by a special process of self-cramming, and that from that imperfect kind of knowledge they cram a number of the younger pupils, whom I guess to be mere children, and who answer by rote." Also, from Questions 601, 602, it appears that Dr. Ramsay "infers" that "the instruction given is chiefly from books," and that it "very rarely happens that the instruction is gained in any other way, from specimens or from practical knowledge."

Professor FRANKLAND, speaking of the results of his own examinations of the Chemistry papers, says (Questions 766), "It was evident that the candidates had depended too much upon mere book-work and oral instruction; they had not been sufficiently brought into contact with the phenomena themselves. . . . Practical instruction, in which the pupil is made an operator, is by far the most valuable kind of chemical teaching. . . . A training in experimental Science does not contemplate merely the reading and committing to memory of the thoughts of others, but much more, an actual contact of the student with the phenomena presented by the objects which surround him."

Professor WILLIAMSON, in reference to the test of the teacher's fitness, says (Question 1187*a*): — "The examination test alone, when applied as it is, is productive of one great evil, especially when examinations aim at directing teaching, and profess to take the lead of teachers, and that is to call forth crams. I believe that there is hardly any case of really good teaching being produced by examinations." Further (Question 1297), "Anybody who has done a thing has learned more than any one who has only seen it."

Mr. T. W. SHORE (Question 2206):—By the present wholesale and indiscriminate system . . . a candidate may be recognized as qualified to teach such a subject as Chemistry without ever having handled chemical apparatus, or even seen a single chemical experiment, for the examination has been, and can be, passed from book-work only. Such an attempt to spread science among the masses will tend inevitably to a decrease of scientific accuracy in teaching, a contempt for the teacher's office, and, among artisans, a loss of confidence in such teachers, the power of maintaining which should be an essential qualification."

Mr. LOUIS MIALL (Question 6247):—"Students are often passed whose knowledge is, I might say, absurdly inadequate—students who have no real knowledge of the subject at all; and this is particularly unfortunate, as the passing of the examination qualifies them to become teachers." Again (Question 6257):—"The teaching which I am accustomed to give would not pass pupils. . . . We endeavor, as far as possible, to make all our teaching practical. . . . Our teaching does not qualify students to pass the examination of the Science and Art Department. . . . They do not get up that style of answers that would suffice to pass them. We endeavor to make our class of instruction sound and practical, but we should have to adopt a totally different system if we aimed at passing a number of pupils." (Question 6277):—"It would appear to me that the essential and cardinal faults of the present system, are, first of all, that the training and teaching qalification of the teachers is far too low; secondly, that owing to the entire absence of practical examination, a very defective style of teaching is encouraged; and thirdly, that it is at the option of the teacher to take any subjects he pleases, in any order."

III.—THE TEACHING OF NATURE AND FACT.

"The entire process of the earliest instruction of children should consist in training the faculties for their subsequent work; and for this instruction God's book of the Universe is better suited than any books of men. The facts and phenomena of Nature are the sentences, words and letters which, before all others, the child should be taught to read; and if taught to read them by a teacher who knows his business, they furnish the soundest and most interesting instruction that the child is capable of receiving. The materials for the lesson are constantly at hand; the faculties for using them are constantly ready for use; and it is the very *raison d'être* of the teacher, the purpose for which he exists, to bring the materials and the faculties into contact; and thus to make the child find tongues in trees, sermons in stones, and books in the running brooks. For want of such teaching, the child grows to a man, and as a man lives all his life, carrying with him eyes which do not see, ears which do not hear, a mind which does not think. By means of such lessons the art of observing may be definitely taught, the art of inventing prompted, and the method of scientific investigation initiated."—*From a paper read by the Lecturer "On the teaching of Elementary Science as a part of the Earliest Instruction of Children," at the Leeds Meeting of the Social Science Association.*

FRŒBEL AND THE KINDERGARTEN SYSTEM OF ELEMENTARY EDUCATION.

AMONG the names of the great Reformers of Education, there is one which has not yet received that honor which it deserves, and with which I firmly believe the future will invest it. It is that of Friedrich Wilhelm August Frœbel. His claims to distinction among educators, are, however, now extensively allowed in his native land, as well as in Switzerland, Holland, France, the United States, and partially even in England. These claims are numerous, and of great importance. While many others have labored with greater or less success at the superstructure of Education, to him belongs the special credit of having earnestly devoted himself to the foundation. While others have taken to the work of Education their own pre-conceived notions of what that work should be, Frœbel stands consistently alone in seeking in the nature of the child the laws of educational action—in ascertaining from the child himself how we are to educate him.

Further, Frœbel is the first teacher to whom it has occurred to convert what is usually considered the waste steam of childish activities and energies into the means of fruitful action; to utilize what has hitherto been looked upon as unworthy of notice; and, moreover, to accomplish this object, not only without repressing the natural free spirit of childhood, but by making that free spirit the very instrument of his purpose.

In laying before you the development of Frœbel's principles of elementary education, I propose to connect with this development a sketch of the personal history of the man. We shall in this way learn to appreciate not only the principles at which he ultimately arrived, but the mental process which led to them.

Frœbel was born April 21st, 1782, at Oberweissbach, in the principality of Schwarzburg-Rudolstadt. His mother died when he was so young that he never even remembered her; and he was left to the care of an ignorant maid-of-all-work who simply provided for his bodily wants. His father, who was the laborious pastor of several parishes, seems to have been solely occupied with his duties, and to have given no concern whatever to the development of the child's mind and character beyond that of strictly confining him within doors, lest he should come to harm by straying away. One of his principal amusements, he tells us, consisted in watching from the window some workmen who were repairing the church, and he remembered long afterwards how he earnestly desired to lend a helping hand himself. The instinct of construction, for the exercise of which, in his system, he makes ample provision, was even then stirring within him. As years went on, though nothing was done for his education by others, he found opportunities for satisfying some of the longings of his soul, by wandering in the woods, gathering flowers, listening to the birds, or to the wind as it swayed the forest trees, watching the movements of all kinds of animals, and laying up in his mind the various impressions then produced, as a store for future years. He was, in fact, left as much to educate himself through nature as was the Mary Somerville of later times. Not until he was ten years of age did he receive the slightest regular instruction. He was then sent to school, to an uncle who lived in the neighborhood. This man, a regular driller of the old, time-honored stamp, had not the slightest conception of the inner nature of his pupil, and seems to have taken no pains whatever to discover it. He pronounced the boy to be idle (which, from his point of view, was quite true) and lazy (which certainly was not true)—a boy, in short, that you could do nothing with. And, in fact, the teacher did nothing with his pupil, never once touched the chords of his inner being, or brought out the music they were fitted, under different handling, to produce. Frœbel was indeed, at that time, a thoughtful, dreamy child, a very indifferent student of books, cordially hating the formal lessons with which he was crammed, and never so happy as when left alone with his great teacher in the woods. The result was, that he left school, after four years, almost as ignorant as when he entered it; carrying with him as the produce of his labor a considerable quantity of chaff, but very little corn. The corn consisted in some elementary notions of mathematics, a subject which interested him throughout his life, and which he brought afterwards to bear on the lessons of the Kindergarten. Circumstances, which had proved so adverse to his development in his school experiences, took a favorable turn in the next step of his life. It was necessary for him to earn his bread, and we next find him a sort of apprentice to a woodsman in the great Thuringian forest. Here, as he afterwards tells us, he lived some years in cordial intercourse with nature and mathematics, learning even then, though unconsciously, from the teaching he received, how to teach others. His daily occupation in the midst of trees led him to observe the laws of nature, and to recognize union and unity in apparently contradictory phenomena. Here, too, he reflected on his previous course of education; and formed very decided opinions on the utter worthlessness of the ordinary school-teaching, as never having reached what was in himself, and, therefore, in his view, failing altogether to be a true culture of the mind and of the man. His life as a forester, which, though certainly not without great influence on his mental character, was not to be his final destination, ended when he was about eighteen years of age. He now went to the University of Jena, where he attended lectures on natural history, physics, and mathematics; but, as he tells us, gained little from them. This result was obviously due to the same dreamy speculative tendency of mind which characterized his earlier school-life. Instead of studying hard, he speculated on unity and diversity, on the relation of the whole to the parts, of the parts to the whole, etc., continually striving after the unattainable and neglecting the attainable. This desultory style of life was put an end to by the failure of means to stay at the University. For the next few years he tried various occupations, ever restlessly tossed to and fro by the demands of the outer life, and not less distracted by the consciousness that his powers had not yet found what he calls their "centre of gravity." At last, however, they found it. While engaged in an architect's office at Frankfort, he formed an acquaintance with the Rector of the Mode School, a man named Gruner. Gruner saw the capabilities of Frœbel, and detected also his entire want of interest in the work that he was doing; and one day suddenly said to him: "Give up your architect's business; you will do nothing at it. Be a teacher. We want one now in the school; you shall have the place." This was the turning point in Frœbel's life. He accepted the engagement, began work at once, and tells us that the first time he found himself in the midst of a class of thirty or forty boys, he felt that he was in the element that he had missed so long — "the fish was in the water." He was inexpressibly happy. This ecstasy of feeling, we may easily imagine, soon subsided. In a calmer mood he severely questioned himself as to the means by which he was to satisfy the demands of his new position. He found the answer, he says, by descending into himself, and listening to the teachings of nature respecting life, mind, and being — lessons already theoretically known, but now, for the first time, correlated with practice. "My hitherto peculiar development, self-cultivation, self-teaching," he says, "as well as my observation of nature and of life, now found their proper place." But he keenly felt, at the same time, the effects of his desultory manner of study. He was neither instructed in knowledge nor in teaching, but he now resolved to make up for his deficiencies in both respects. About this time he met with some of Pestalozzi's writings, which so deeply impressed him that he determined to go to Yverdun, and study Pestalozzism on the spot. He accomplished his purpose, and lived and worked for two years with Pestalozzi. His experience at Yverdun impressed him with the conviction that the science of Education had still to draw out from Pestalozzi's system those fundamental principles which Pestalozzi himself did not comprehend. "And therefore," says Schmidt,* "this genial disciple of Pestalozzi supplemented and completed his system by advancing from the point which Pestalozzi had reached through pressure from without to the innermost conception of man, and arriving at the thought of the true development and the condition of the true culture of mankind." Feeling still his want of positive knowledge, Frœbel spent the next two or three years of his life at the Universities of Göttingen and Berlin. It was now while he was for the first time earnestly engaged in study, that his views on Education gradually gained consistency and form. "Our greatest educators," he says, "even Pestalozzi himself not excepted, appear to me too crudely, empirically, capriciously, and therefore, unscientifically to allow themselves to be led away from nature and nature's laws; they do not appear, indeed, to recognize, honor, and cultivate the divinity of science."

It would only be tedious to relate the various preliminary experiences by which Frœbel — sometimes with few, sometimes with many pupils — sometimes under favorable, at other times under unfavorable circumstances — pursued his course, until the moment when at Blankenburg, near Rudolstadt, he established, about the year 1840, the school to which he first gave the name of Kindergarten. In this name he wished to embody two of his favorite theoretical notions: — the one, that education, as culture, has to do with children as human plants, which are to be surrounded with circumstances favorable to their free development, and to be trained by means suited to their nature; and the other, that a school for little children should have attached to it a garden, in which they may exercise their natural taste for flowers, and be not only the observers but the cultivators of plants. Frœbel, as well as his disciples of the present day, protest against the application of the name School to the Kindergarten, which is, in their view, a place for the development of the activities and capabilities of children before the usual school age begins. The Kindergarten proper is intended for children of between three and seven years of age. Its purpose is thus briefly indicated by himself: — To take the oversight of children before they are ready for school-life; or exert an influence over their whole being in correspondence with its nature; to strengthen their bodily powers; to exercise their senses; to employ the awakening mind; to make them thoughtfully acquainted with the world of nature and of man; to guide their heart and soul in a right direction, and lead them to the Origin of all life and to union with Him."

You will have observed already that in this programme there is no mention made of reading, writing, and arithmetic; of grammar, geography, and history; of rules, precepts, or general propositions; not a word about books, nor even of instruction at all in its ordinary sense; yet you will also have observed that there is ample provision for activity and energy of various kinds — activity of limbs, activity of the senses, activity of the mind, heart, and of the religious instinct. It is in this immense field of natural energies that the Frœbelian idea "lives, moves, and has its being." You will see that the carrying out of this programme involves something very different in spirit and essence from the ordinary course of an English infant school, to which children are often carried merely "to get them out of the way."

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* *Geschichte der Pädagogik,* IV, 284.

Having said at the commencement of this lecture that Frœbel as an educator begins at the very beginning, I ought now to add that in his great work, "On the Education of Man," he takes into consideration the circumstances of the child during the period which precedes the Kindergarten age, and gives many valuable hints to guide the mother, who is Nature's deputy and helper, for the first three years of its life. As, however, to describe his views and plans in relation to that period would occupy us too long, I confine myself to the Kindergarten age. In Frœbel's opinion, the mother who consults the true interests of her child, will, when he is three years old, give him up to the governess of the Kindergarten. In this respect he differed from Pestalozzi, who thought that the mother, as the natural educator of the child, ought to retain the charge of him up to his sixth or seventh year. It is easy to see that if this opinion be acted on, the education of the child will be restricted to the experience of the family circle. According to Frœbel, this basis is too narrow. The family circle does not generally afford a sufficient scope for the development of those activities which, in their combination, constitute life. A system of education, therefore, founded on this narrow basis, does not really prepare the child for that intercommunion and constant intercourse with his fellowmen of which life, broadly interpreted, consists. Frœbel, moreover doubts, with much reason, whether mothers generally are qualified for the task assigned them by Pestalozzi, and points out that, if they are not, the child must suffer from their incompetence, even if he lose nothing through neglect occasioned by the demands of the household upon their time and strength. He, therefore, insists that in order to furnish children with opportunities for displaying and developing all their natural capabilities, they must be brought together in numbers. The mutual action and reaction of forces and activities thus necessitated presents, in fact, a miniature picture of the larger life to which they are destined. The passions, emotions, sufferings, desires of our common humanity, have here both scope and occasion for their fullest manifestation; while the intellectual powers, under the stimulus of inexhaustible curiosity and of aptitude for imitation and invention, are excited to constant action. At the same time the bodily powers — hands, feet, muscles, senses — under the influence and impulse of companionship, are more actively exercised, and the health of the constitution thereby promoted, while a larger and better opportunity is supplied for learning the resources of the mother-tongue. The Kindergarten, therefore, for its full development, requires the bringing together of children in numbers; in order that they may not only be educated, but educate themselves and each other; and requires, moreover, the surrender, on the mother's part, of the charge which she is, as a rule, unfitted to discharge, into the hands of those who understand, and are trained for the work. This, then, is one of the cases in which Frœbel takes a crude and unconditioned notion of Pestalozzi's, and organizes it into a clear and consistent rule of action.

But we are still only standing on the circumference of Frœbel's expansive idea of education. Let us now enter within the circle, and make our way to the centre. In order to do this effectually, let us form a conception of the genesis of the idea — an idea not less distinguished by its originality as a theory than by its far-extending practical issues.

Let us imagine to ourselves Frœbel, after profoundly studying human nature in general, both in books and life, and minutely observing and studying the nature of children; in possession, too, of a large theoretical knowledge of education, as a means for making the best of that nature; and, at the same time, impressed with a sorrowful conviction, founded partly on his own experience, that most of what is called education, is not only unnatural, but anti-natural, as failing to reach the inner being of the child, and even counteracting and thwarting its spontaneous development, — let us, I say, imagine Frœbel, thus equipped as an observer, taking his place amidst a number of children disporting themselves in the open air without any check upon their movements.

After looking on the pleasant scene awhile, he breaks out into a soliloquy:—" What exuberant life! What immeasurable enjoyment! What unbounded activity! What on evolution of physical forces! What a harmony between the inner and the outer life! What happiness, health, and strength! Let me look a little closer. What are these children doing? The air rings musically with their shouts and joyous laughter. Some are running, jumping or bounding along, with eyes like the eagle's bent upon its prey, after the ball which a dexterous hit of the bat sent flying among them; others are bending down towards the ring filled with marbles, and endeavoring to dislodge them from their position; others are running friendly races with their hoops; others again, with arms laid across each other's shoulders, are quietly walking and talking together upon some matter in which they evidently have a common interest. Their natural fun gushes out from eyes and lips. I hear what they say. It is simply expressed, amusing, generally intelligent, and often even witty. But there is a small group of children yonder. They seem eagerly intent on some subject. What is it? I see one of them has taken a fruit from his pocket. He is showing it to his fellows. They look at it and admire it. It is new to them. They wish to know more about it,—to handle, smell, and taste it. The owner gives it into their hands; they feel and smell but not taste it. They give it back to the owner, his right to it being generally admitted. He bites it, the rest looking eagerly on to watch the result. His face shows that he likes the taste; his eyes grow brighter with satisfaction. The rest desire to make his experience their own. He sees their desire, breaks or cuts the fruit in pieces, which he distributes among them. He adds to his own pleasure by sharing in theirs. Suddenly a loud shout from some other part of the ground attracts the attention of the group, which scatters in all directions. Let me now consider. What does all this manifold movement—this exhibition of spontaneous energy—really mean? To me it seems to have a profound meaning

It means—

"(1) That there is an immense external development and expansion of energy of various kinds—physical, intellectual, and moral. Limbs, senses, lungs, tongues, minds, hearts, are all at work—all co-operating to produce the general effect.

"(2) That activity—doing—is the common characteristic of this development of force.

"(3) That spontaneity—absolute freedom from outward control—appears to be both impulse and law to the activity.

"(4) That the harmonious combination and interaction of spontaneity and activity constitute the happiness which is apparent. The will to do prompts the doing; the doing reacts on the will.

"(5) That the resulting happiness is independent of the absolute value of the exciting cause. A bit of stick, a stone, an apple, a marble, a hoop, a top, as soon as they become objects of interest, call out the activities of the whole being quite as effectually as if they were matters of the greatest intrinsic value. It is the action upon them—the doing something with them—that invests them with interest.

"(6) That this spontaneous activity generates happiness because the result is gained by the children's own efforts, without external interference. What they do themselves and for themselves, involving their own personal experience, and therefore exactly measured by their own capabilities, interests them. What another, of trained powers, standing on a different platform of advancement, does *for them*, is comparatively uninteresting. If such a person, from whatever motive, interferes with their spontaneous activity, he arrests the movement of their forces quenches their interest at least for the moment; and they resent the interference.

"Such, then, appear to be the manifold meanings of the boundless spontaneous activity that I witness. But what name, after all, must I give to the totality of the phenomena exhibited before me. I must call them Play. Play, then, is spontaneous activity ending in the satisfaction of the natural desire of the child for pleasure — for happiness. *Play is the natural, the appropriate business and occupation of the child left to his own resources.* The child that does not play, is not a perfect child. He wants something — sense-organ, limb, or generally what we imply by the term health — to make up our ideal of a child. The healthy child plays — plays continually — cannot but play.

"But has this instinct for play no deeper significance? Is it appointed by the Supreme Being merely to fill up time? — merely to form an occasion for fruitless exercise? — merely to end in itself? No! I see now that it is the constituted means for the unfolding of all the child's powers. It is through play that he learns the use of his limbs, of all his bodily organs, and with this use gains health and strength. Through play he comes to know the external world, the physical qualities of the objects which surround him, their motions, action and reaction upon each other, and the relation of these phenomena to himself; a knowledge which forms the basis of that which will be his permanent stock for life. Through play, involving associateship and combined action, he begins to recognize moral relations, to feel that he cannot live for himself alone, that he is a member of a community, whose rights he must acknowledge if his own are to be acknowledged. In and through play, moreover, he learns to contrive means for securing his ends; to invent, construct, discover, investigate, to bring by imagination the remote near, and, further, to translate the language of facts into the language of words, to learn the conventionalities of his mother-tongue. Play, then, I see, is the means by which the entire being of the child develops and grows into power, and, therefore, does not end in itself.

"But an agency which effects results like these, is an education agency; and *Play*, therefore, *resolves itself into education:* education which is independent of the formal teacher, which the child virtually gains for and by himself. This, then, is the outcome of all that I have observed. The child, through the spontaneous activity of all his natural forces, is really developing and strengthening them for future use; he is working out his own education.

"But what do I, who am constituted by the demands of society as the formal educator of these children, learn from the insight I have thus gained into their nature? I learn this — that I must educate them in conformity with that nature. I must continue, not supersede, the course already begun; my own course must be based upon it. I must recognize and adopt the principles involved in it, and frame my laws of action accordingly. Above all, I must not neutralize and deaden that spontaneity which is the main-spring of all the machinery; I must rather encourage it, while ever opening new fields for its exercise, and giving it new directions. Play, spontaneous play, is the education of little children; but it is not the whole of their education. Their life is not to be made up of play. Can I not then even now gradually transform their play into work, but work which shall look like play? — work which shall originate in the same or similar impulses, and exercise the same energies as I see employed in their own amusements and occupations? Play, however, is a random, desultory education. It lays the essential basis; but it does not raise the superstructure. It requires to be organized for this purpose, but so organized that the superstructure shall be strictly related and conformed to the original lines of the foundation.

"*I see that these children delight in movement;* they are always walking or running, jumping, hopping, tossing their limbs about, and, moreover, they are pleased with rhythmical movement. I can contrive motives and means for the same exercise of the limbs, which shall result in increased physical power, and consequently in health — shall train the children to a conscious and measured command of their bodily functions, and at the same time be accompanied by the attraction of rhythmical sound through song or instrument.

"*I see that they use their senses;* but merely at the accidental solicitation of surrounding circumstances, and therefore imperfectly. I can contrive means for a definite education of the senses, which shall result in increased quickness of vision, hearing, touch, etc. I can train the purblind eye to take note of delicate shades of color, the dull ear to appreciate minute differences of sound.

"*I see that they observe;* but their observations are for the most part transitory and indefinite, and often, therefore, comparatively unfruitful. I can contrive means for concentrating their attention by exciting curiosity and interest, and educate them in the art of observing. They will thus gain clear and definite perceptions, bright images in the place of blurred ones, will learn to recognize the difference between complete and incomplete knowledge, and gradually advance from the stage of merely knowing to that of knowing that they know.

"*I see that they invent and construct;* but often awkwardly and aim lessly. I can avail myself of this instinct, and open to it a definite field of action. I shall prompt them to invention, and train them in the art of construction. The materials I shall use for this end will be simple; but in combinining them together for a purpose, they will employ not only their knowledge of form, but their imagination of the capabilities of form. In various ways I shall prompt them to invent, construct, contrive, imitate, and in doing so develop their nascent taste for symmetry and beauty.

"And so in respect to other domains of that child-action which we call play, I see that I can make these domains also my own. I can convert children's activities, energies, amusements, occupations, all that goes by the name of play, into instruments for my purpose, and, therefore, transform play into work. This work will be education in the true sense of the term. The conception of it as such I have gained from the children themselves. They have taught me how I am to teach them."

And now Frœbel descends from the imaginary platform where he has been holding forth so long. I have endeavored, in what has preceded, to give you as clear a notion as I could of the genesis of his root-idea: and I may say, in passing, that it is well for you that I, and not Frœbel himself, have been the expositor; for anything more cloudy, involved, obscure and mystical than Frœbel's own style of writing can hardly be conceived. It has been my task to keep the clouds out of sight, and admit upon the scene only the genial light that breaks out from between them.

Having thus brought before you what I call Frœbel's statical theory of the education of little children of from three to seven years of age, I now proceed to describe the means by which it was made dynamical — that is, exhibited in practice. But before I do so, I will add to the particulars of his life, that after founding the Kindergarten at Blankenburg, and carrying it on for some years, he left it to establish and organize others in various parts of Germany, and at last died at Liebenstein, June 21, 1852. Thus passed away a man of remarkable insight into human nature, and especially into children's nature,—of wonderful energy of character when once roused to action, — of all-pervading philanthropy — a man, I repeat, to whom alone is due the fruitful and original conception of availing himself, as a teacher, of the spontaneous activities of children as the means of their formal education, and therefore, of laying on this foundation the superstructure of their physical, intellectual, and moral life.

And now, I must endeavor to give some notion of the manner in which Frœbel *reduced* his theory to practice. In doing this, the instances I bring forward, must be considered as typical. If you admit — and you can hardly do otherwise — the reasonableness of the theory, as founded on the nature of things, you can hardly doubt that there is some method of carrying it out. Now, a method of education involves many processes, all of which must represent more or less the principles which form the basis of the method. It is quite out of my power, for want of time, to describe the various processes which exhibit to us the little child pursuing his education by walking to rhythmic measure, by gymnastic exercises generally, learning songs by heart and singing them, practising his senses with a definite purpose, observing the properties of objects, counting, getting notions of color and form, drawing, building with cubical blocks, modelling in wax or clay, braiding slips of various colored paper after a pattern, pricking or cutting forms in paper, curving wire into different shapes, folding a sheet of paper and gaining elementary notions of geometry, learning the resources of the mother-tongue by hearing and relating stories, fables, etc., dramatizing, guessing riddles, working in the garden, etc., etc. These are only some of the activities naturally exhibited by young children, and these the teacher of young children is to employ for his purpose. As, however, they are so numerous, I may well be excused for not even attempting to enter minutely into them. But there is one series of objects and exercises therewith connected, expressly devised by Frœbel to teach the art of observing, to which, as being typical, I will now direct your attention. He calls these objects, which are gradually and in orderly succession introduced to the child's notice, Gifts — a pleasant name, which is, however, a mere accident of the system; they might equally well be called by any other name. As introductory to the series, a ball made of wool, of say a scarlet color, is placed before the baby. It is rolled along before him on the table, thrown along the floor, tossed into the air, suspended from a string, and used as a pendulum, or spun round on its axis, or made to describe a circle in space, etc. It is then given into his hand; he attempts to grasp it, fails; tries again, succeeds; rolls it along the floor himself, tries to throw it, and, in short, exercises every power he has upon it, always pleased, never wearied in *doing* something or other with it. This is play, but it is play which resolves itself into education. He is gaining notions of color, form, motion, action and re-action, as well as of muscular sensibility. And all the while the teacher associates words with things and actions, and, by constantly employing words in their proper sense and in the immediate presence of facts, initiates the child in the use of his mother-tongue. Thus, in a thousand ways, the scarlet ball furnishes sensations and perceptions for the substratum of the mind, and suggests fitting language to express them; and even the baby appears before us as an observer, learning the properties of things by personal experience.

Then comes the first Gift. It consists of six soft woollen balls of six different colors, three primary and three secondary. One of these is recognized as like, the others as unlike, the ball first known. The laws of similarity and discrimination are called into action; sensation and perception grow clearer and stronger. I cannot particularize the numberless exercises that are to be got out of the various combinations of these six balls.

The second Gift consists of a sphere, cube, and cylinder, made of hard wood. What was a ball before, is now called a sphere. The different material gives rise to new experiences; a sensation, that of hardness for instance, takes the place of softness; while varieties of form suggest resemblance and contrast. Similar experiences of likeness and unlikeness are suggested by the behavior of these different objects. The easy rolling of the sphere, the sliding of the cube, the rolling as well as sliding of the cylinder, illustrate this point. Then the examination of the cube, especially its surfaces, edges, and angles, which any child can observe for himself, suggest new sensations and their resulting perceptions At the same time, notions of space, time, form, motion, relativity in general, take their place in the mind, as the unshaped blocks which, when fitly compacted together, will lay the firm foundation of the understanding. These elementary notions, as the very groundwork of mathematics, will be seen to have their use as time goes on.

The third Gift is a large cube, making a whole, which is divisible into eight small ones. The form is recognized as that of the cube before seen; the size is different. But the new experiences consist in notions of relativity — of the whole in its relation to the parts, of the parts in their relation to the whole; and thus the child acquires the notion and the names, and both in immediate connection with the sensible objects, of halves, quarters, eights, and of how many of the small divisions make one of the larger. But in connection with the third Gift a new faculty is called forth — Imagination, and with it the instinct of construction is awakened. The cubes are mentally transformed into blocks: and with them building commences. The constructive faculty suggests imitation, but rests not in imitation. It invents, it creates. Those eight cubes, placed in a certain relation to each other, make a long seat, or a seat with a back, or a throne for the Queen; or again, a cross, a doorway, etc. Thus does even play exhibit the characteristics of art, and "conforms (to use Bacon's words) the outward show of things to the desires of the mind," and thus the child, as I said before, not merely imitates, but creates. And here, I may remark, that the mind of the child is far less interested in that which another mind has embodied in ready prepared forms, than in the forms which he conceives, and gives outward expression to, himself. He wants to employ his own mind, and his whole mind, upon the object, and does not thank you for attempting to deprive him of his rights.

The fourth, fifth, and sixth Gifts consist of the cube variously divided into solid parallelopipeds, or brick-shaped forms, and into smaller cubes and prisms. Observation is called on with increasing strictness, relativity appreciated, and the opportunity afforded for endless manifestations of constructiveness. And all the while impressions are forming in the mind, which, in due time, will bear geometrical fruits, and fruits, too, of æsthetic culture. The dawning sense of the beautiful, as well as the true, is beginning to gain consistency and power.

I cannot further dwell on the numberless modes of manipulation of which these objects are capable, nor enter further into the groundwork of principles on which their efficiency depends.

It is needless to say that various objections have been make to Frœbel's method, especially by those whose ignorance of the laws of mental development disqualifies them, in fact, for giving an opinion on it at all, and also by others, whose earnest work at various points of the superstructure so absorbs their energies that they have none to spare for considering the foundation. But even among those who have considered the working of mental laws, though in many cases from the standpoint of a favorite theory, there are some who still doubt and object. I will attempt to deal with one or two of their objections. It is said, for instance, without proof, that we demand too much from little children, and, with the best intentions, take them out of their depth. This might be true, no doubt, if the system of means adopted had any other basis than the nature of the children; if we attempted theoretically, and without regard to that nature, to determine ourselves what they can and what they cannot do; but when we constitute spontaneity as the spring of action, and call on them to do that, and that only, which they can do, which they do of their own accord when they are educating themselves, it is clear that the objection falls to the ground. The child who teaches himself, never can go out of his depth; the work he does is that which he has strength to do; the load he carries cannot but be fitted to the shoulders that bear it, for he has gradually accumulated its contents by his own repeated exertions. This increasing burden is, in short, the index and result of his increasing powers, and commensurate with them. The objector in this case, in order to gain even a plausible foothold for his objection, must first overthrow the radical principle, that the activities, amusements, and occupations of the child, left to himself, do indeed constitute his earliest education, and that it is an education which he virtually gives himself.

Another side of this objection, which is not unfrequently presented to us, derives its plausibility from the assumed incapacity of children. The objector points to this child or that, and denounces him as stupid and incapable. Can the objector, however, take upon himself to declare that this or that child has not been made stupid even by the very means employed to teach him? The test, however, is a practical one: Can the child play? If he can play, in the sense which I have given to the word, he cannot be stupid. In his play he employs the very faculties which are required for his formal education. "But he is stupid at his books." If this is so, then the logical conclusion is, that the books have made him stupid, and you, the objector, who has misconceived his nature, and acted in direct contradiction to it, are yourself responsible for his condition.

"But he has no memory. He cannot learn what I tell him to learn." No memory! Cannot learn! Let us put that to the test. Ask him about the pleasant holiday a month ago, when he went nutting in the woods. Does he remember nothing about the fresh feel of the morning air, the joyous walk to the wood, the sunshine which streamed about his path, the agreeable companions with whom he chatted on the way, the incidents of the expedition, the climb up the trees, the bagging of the plunder? Are all these matters clean gone out of his mind? "Oh no, he remembers things like these." Then he has a memory, and, a remarkably good one. He remembered because he was interested; and if you wish him to remember your lessons, you must make them interesting. He will certainly learn what he takes an interest in.

I need not deal with other objections. They all resolve themselves into the category of ignorance of the nature of the child. When public opinion shall demand such knowledge from teachers as the essential condition of their taking in hand so delicate and even profound an art as that of training children, all these objections will cease to have any meaning.

As I have doubtless appeared throughout this lecture as not only the expositor but the advocate of Frœbel's principles, it is only right to say that this has arisen from the fact that, without knowing it, I have been myself for many years preaching from the same text. My close acquaintance with Frœbel's theory, and especially with his root-idea, is comparatively recent. But when I had studied it as a theory, and witnessed something of its practice, I could not but see at once that I had been throughout an unconscious disciple, as it were, of the eminent teacher. The plan of my own course of lectures on the Science and Art of Education was, in fact, constructed in thought before I had at all grasped the Fröbelian idea; and was, in that sense, independent of it. But every one who hears my lectures — which are founded on the natural history of the child — must be at once aware that Frœbel's notions and mine are virtually the same.*

The Kindergarten is gradually making its way in England, without the achievement as yet of any eminent success; but in Switzerland, Holland, Italy, and the United States, as well as in Germany, it is rapidly advancing. Wherever the principles of education, as distinguished from its practice, are a matter of study and earnest thought, there it prospers. Wherever, as in England for the most part, the practical alone is considered, and where teaching is thought to be "as easy as lying," any system of education founded on psychological laws must be tardy in its progress.

I should be glad to think that I have by this lecture either kindled an interest hitherto unfelt in the Kindergarten, or supplied those who felt the interest before, with arguments to justify it.

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* See the "Science and Art of Education: a Lecture delivered at the College of Preceptors on the 20th January, 1874."

PESTALOZZI: THE INFLUENCE OF HIS PRINCIPLES AND PRACTICE ON ELEMENTARY EDUCATION.

FAMILIAR as Pestalozzi's name is to our ears, it will hardly be pretended that he himself is well known amongst us. His life and personal character — the work he did himself, and that which he influenced others to do — his successes and failures as a teacher, form altogether a large subject, which requires, to do it justice, a thoughtful and lengthened study. Parts of the subject have been from time to time brought very prominently before the public, but often in such a way as to throw the rest into shadow, and hinder the appreciation of it as a whole. Though this has been done without any hostile intention, the general effect has been in England to misrepresent, and therefore to under-estimate, a very remarkable man—a man whose principles, slowly but surely operating on the public opinion of Germany, have sufficed, to use his own pithy expression, "to turn right round the car of Education, and set it in a new direction."

One of the aspects in which he has been brought before us — and it deserves every consideration — is that of an earnest, self-sacrificing, enthusiastic philanthropist, endowed with what Richter calls "an almighty love," whose first and last thought was how he might raise the debased and suffering among his countrymen to a higher level of happiness and knowledge, by bestowing upon them the blessings of education. It is right that he should be thus exhibited to the world, for never did any man better deserve to be enrolled in the noble army of martyrs who have died that others might live, than Pestalozzi. To call him the Howard of educational philanthropists, is only doing scant justice to his devoted character, and under-estimates, rather than over-estimates, the man.

Another aspect in which Pestalozzi is sometimes presented to us, is that of an unhandy, unpractical, dreamy theorist; whose views were ever extending beyond the compass of his control; who, like the djinn of the Eastern story, called into being forces which mastered instead of obeying him; whose "unrivalled incapacity for governing" (this is his own confession) made him the victim of circumstances; who was utterly wanting in worldly wisdom; who knowing man, did not know men; and who, therefore, is to be set down as one who promised much more than he performed. It is impossible to deny that there is substantial truth in such a representation; but this only increases the wonder that, in spite of his disqualifications, he accomplished so much. It is still true that his awakening voice, calling for reform in education, was responded to by hundreds of earnest and intelligent men, who placed themselves under his banner, and were proud to follow whither the Luther of educational reform wished to lead them.

A third view of Pestalozzi presents him to us as merely interested about elementary education—and this appears to many who are engaged in teaching what are called higher subjects, a matter in which they have little or no concern. Those, however, who thus look down on Pestalozzi's work, only show, by their indifference, a profound want, both of self-knowledge, and of a knowledge of his principles and purpose. Elementary education, in the sense in which Pestalozzi understands it, is, or ought to be, the concern of every teacher, whatever be his especial subject, and whatever the age of his pupils; and when he sees that elementary education is only another expression for the forming of the character and mind of the child, he must acknowledge that this object comes properly within the sphere of his labors, and deserves, on every ground, his thoughtful attention.

In spite, then, of Pestalozzi's patent disqualifications in many respects for the task he undertook; in spite of his ignorance on even common subjects (for he spoke, read, wrote, and ciphered badly, and knew next to nothing of classics or science); in spite of his want of worldly wisdom, of any comprehensive and exact knowledge of men and of things; in spite of his being merely an elementary teacher,—through the force of his all-conquering love, the nobility of his heart, the resistless energy of his enthusiasm, his firm grasp of a few first principles, his eloquent exposition of them in words, his resolute manifestation of them in deeds,—he stands forth among educational reformers as the man whose influence on education is wider, deeper, more penetrating than that of all the rest—the prophet and the sovereign of the domain in which he lived and labored.

The fact that, with such disqualifications and drawbacks, he has attained such a position, supersedes any argument for our giving earnest heed to what he was and what he did. It is a fact pregnant in suggestions, and to the consideration of them this Lecture is to be devoted.

It was late in life—he was fifty-two years of age—before Pestalozzi became a practical schoolmaster. He had even begun to despair of ever finding the career in which he might attempt to realize the theories over which his loving heart and teeming brain had been brooding from his earliest youth. He feared that he should die, without reducing the ideal of his thought to the real of action.*

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* See the particulars of Pestalozzi's life, in Mr. Quick's admirable *Essays on Educational Reformers*; in *Pestalozzi*, edited for the Home and Colonial Society,

Besides the advanced age at which Pestalozzi began his work, there was another disability in his case to which I have not referred. This was, that not only had he had no experience of school work, but knew no eminent teacher whose example might have stimulated him to imitation; and he was entirely ignorant (with one notable exception) of all writings on the theory and practice of education. The exception I refer to is the *Émile* of Rousseau, a remarkably suggestive book, which made, as was to be expected, a strong impression on his mind. We know from his own account, that he had already endeavored, with indifferent success, to make his own son another Émile. The diary in which he has recorded day by day the particulars of his experiment is extremely interesting and instructive.

At fifty-two years of age, then, we find Pestalozzi utterly unacquainted with the science and the art of education, and very scantily furnished even with elementary knowledge, undertaking at Stanz, in the canton of Unterwalden, the charge of eighty children, whom the events of war had rendered homeless and destitute. Here he was at last in the position which, during years of sorrow and disappointment, he had eagerly desired to fill. He was now brought into immediate contact with ignorance, vice, and brutality, and had the opportunity for testing the power of his long cherished theories. The man whose absorbing idea had been that the ennobling of the people, even of the lowest class, through education, was no mere dream, was now, in the midst of extraordinary difficulties, to struggle with the solution of the problem. And surely if any man, consciously possessing strength to fight, and only desiring to be brought face to face with his adversary, ever had his utmost wishes granted, it was Pestalozzi at Stanz. Let us try for a moment to realize the circumstances — the forces of the enemy on the one side, and the single arm on the other, and the field of the combat. The house in which the eighty children were assembled, to be boarded, lodged, and taught, was an old tumble-down Ursuline convent, scarcely habitable, and destitute of all the conveniences of life. The only apartment suitable for a schoolroom was about twenty-four feet square, furnished with a few desks and forms; and into this were crowded the wretched children, noisy, dirty, diseased, and ignorant, with the manners and habits of barbarians. Pestalozzi's only helper in the management of the institution was an old woman, who cooked the food and swept the rooms; so that he was, as he tells

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by Mr. Dunning, in Von Raumer's *History of Education;* in Roger de Guimps' *Histoire de Pestalozzi, de sa Pensée, et de son Œuvre,* Lausanne, 1874; in the *Life and Work of Pestalozzi,* by Hermann Krüsi, New York, 1875; and in various treatises by Mr. Henry Barnard, late of the State Department of Education, Washington.

us himself, not only the teacher, but the pay-master, the man-servant, and almost the house-maid of the children.

Here, then, we see Pestalozzi, surrounded by a "sea of troubles," against which he has not only "to take arms," but to forge the arms himself. And what was the single weapon on which he relied for conquest? It was his own loving heart. Hear his words: — "My wishes were now accomplished. I felt convinced that my *heart* would change the condition of my children as speedily as the springtide sun reanimates the earth frozen by the winter." "Nor," he adds, "was I mistaken. Before the springtide sun melted away the snow from our mountains, you could no longer recognize the same children.

But how was this wonderful transformation effected? What do Pestalozzi's words really mean? Let us pause a moment to consider them. Here is a man who, in presence of ignorance, obstinacy, dirt, brutality, and vice — enemies that will destroy *him* unless he can destroy *them* — opposes to them the unresistible might of weakness, or what appears such, and fights them with his *heart!*

Let all teachers ponder over the fact, and remember that this weapon, too frequently forgotton, and therefore unforged in our training colleges, is an indespensable requisite to their equipment. Wanting this, all the paraphernalia of literary certificates — even the diplomas of the College of Preceptors — will be unavailing. With it, the teacher, poorly furnished in other respects (think of Pestalozzi's literary qualifications!), may work wonders, compared with which the so-called magician's are mere child's play. The first lesson, then, that we learn from Pestalozzi is, that the teacher must have a heart — an apparently simple but really profound discovery, to which we cannot attach too much importance.

But Pestalozzi's own heart was not merely a statical heart — a heart furnished with capabilities for action, but not acting; it was a dynamical heart — a heart which was constantly at work, and vitalized the system. Let us see how it worked.

"I was obliged," he says, "unceasingly to be everything to my children. I was alone with them from morning to night. It was from my hand that they received whatever could be of service both to their bodies and minds. All succor, all consolation, all instruction came to them immediately from myself. Their hands were in my hand; my eyes were fixed on theirs, my tears mingled with theirs, my smiles encountered theirs, my soup was their soup, my drink was their drink. I had around me neither family, friends, nor servants; I had only them. I was with them when they were in health, by their side when they were ill. I slept in their midst. I was the last to go to bed, the first to rise in the morning. When we were in bed, I used to pray with them, and talk to them till they went to sleep. They wished me to do so."

This active, practical, self-sacrificing love, beaming on the frozen hearts of the children, by degrees melted and animated them. But it was only by degrees. Pestalozzi was at first disappointed. He had expected too much, and had formed no plan of action. He even rather prided himself upon his want of plan.

"I knew," he says, "no system, no method, no art but that which rested on the simple consequences of the firm belief of the children in my love towards them. I wished to know no other.

Before long, however, he began to see that the response which the movement of his heart towards theirs called forth was rather a response of his personal efforts, than one dictated by their own will and conscience. It excited action, but not spontaneous, independent action. This did not satisfy him. He wished to make them act strictly from moral motives.

Gradually, then, Pestalozzi advanced to the main principles of his system of moral education — that virtue, to be worth anything, must be practical; that it must consist not merely in knowing what is right, but in doing it; that even knowing what is right does not come from the exposition of dogmatic precepts, but from the convictions of the conscience; and that, therefore, both knowing and doing rest ultimately on the enlightment of the conscience through the exercise of the intellect.

He endeavored, in the first place, to awaken the moral sense — to make the children conscious of their moral powers, and to accomplish his object, not by preaching to them, though he sometimes did this, but by calling these powers into exercise. He gave them, as he tells us, few explanations. He taught them dogmatically neither morality nor religion. He wished them to be both moral and religious; but he conceived that it was not possible to make them so by verbal precept, by word of command, nor by forcing them to commit to memory formularies which did not represent their own convictions. He did not wish them to say they believed, before they believed. He appealed to what was divine in their hearts, implanted there by the supreme Creator; and having brought it out into consciousness, called on them to exhibit it in action. "When," he says, "the children were perfectly still, so that you might hear a pin drop, I said to them, 'Don't you feel yourselves more reasonable and more happy now than when you are making a disorderly noise?' When they clung round my neck and called me their father, I would say, 'Children, could you deceive your father? Could you, after embracing me thus, do behind my back what you know I disapprove of?' And when we were speaking about the misery of our country, and they felt the happiness of their own lot, I used to say, 'How good God is, to make the heart of man pitiful and compassionate.'" At other times, after telling them of the desolation of some family in the neighborhood, he would ask them whether they were willing to sacrifice a portion of their own food to feed the starving children of that family?

These instances will suffice to show generally what Pestalozzi meant by moral education, and how he operated on the hearts and consciences of the children. We see that, instead of feeding their imagination with pictures of virtue beyond and above their sphere, he called on them to exercise those within their reach. He knew what their ordinary family life had been, and he wished to prepare them for something better and nobler; but he felt that this could only be accomplished by making them, while members of *his* family, consciously appreciate what was right and desire to do it.

Here then, in moral and, as we shall presently see, in intellectual education, Pestalozzi proceeded from the near, the practical, the actual — to the remote, the abstract, the ideal. It was on the foundation of what the children were, and could become, in the sphere they occupied, that he built up their moral education.

But he conceived — and, I think, justly — that their intellectual training was to be looked on as part of their moral training. Whatever increases our knowledge of things as they are, leads to the appreciation of the truth; for truth, in the widest sense of the term, is this knowledge. But the acquisition of knowledge, as requiring mental effort, and therefore exercising the active powers, necessarily increases the capacity to form judgments on moral questions; so that, in proportion as you cultivate the will, the affections, and the conscience, with a view to independent action, you must cultivate the intellect, which is to impose the proper limits on that independence; and on the other hand, in proportion as you cultivate the intellect, you must train the moral powers which are to carry its decisions into effect. Moral and intellectual education must consequently, in the formation of the human being, proceed together, the one stimulating and maintaining the action of the other. Pestalozzi, therefore, instructed as well as educated; and indeed educated by means of instruction. In carrying out this object, he adopted the general principle I before stated. He proceeded from the near, the practical, the actual, to the remote, the abstract, and the ideal.

We shall see his theoretical views on this point in a few quotations from a work which he wrote some years before, entitled "*The Evening Hour of a Hermit.*" He says:—

"Nature develops all the human faculties by practice, and their growth depends on their exercise."

"The circle of knowledge commences close around a man, and thence extends concentrically."

"Force not the faculties of children into the remote paths of knowledge, until they have gained strength by exercise on things that are near them."

"There is in Nature an order and march of development. If you disturb or interfere with it you mar the peace and harmony of the mind. And this you do, if, before you have formed the mind by the progressive knowledge of the realities of life, you fling it into the labyrinth of words, and make them the basis of development."

"The artificial march, of the ordinary school, anticipating the order of Nature, which proceeds without anxiety and without haste, inverts this order by placing words first, and thus secures a deceitful appearance of success at the expense of natural and safe development."

In these few sentences we recognize all that is most characteristic in the educational principles of Pestalozzi.

I will put them into another form:

(1) There is a natural order in which the powers of the human being develop or unfold themselves.

(2) We must study and understand this order of Nature, if we would aid, and not disturb, the development.

(3) We aid the development, and consequently promote the growth of the faculties concerned in it, when we call them into exercise.

(4) Nature exercises the faculties of children on the realities of life — on the near, the present, the actual.

(5) If we would promote that exercise of the faculties which constitutes development and ends in growth, we also, as teachers, must, in the case of children, direct them to the realities of life — to the things which come in contact with them, which concern their immediate interests, feelings, and thoughts.

(6) Within this area of personal experience we must confine them, until, by assiduous, practical exercise in it, their powers are strengthened, and they are prepared to advance to the next concentric circle, and then to the next, and so on, in unbroken succession.

(7) In the order of Nature, things go before words, the realities before the symbols, the substance before the shadow. We cannot, without disturbing the harmonious order of the development, invert this order. If we do so, we take the traveller out of the open sunlit high-road, and plunge him into an obscure labyrinth, where he gets entangled and bewildered, and losses his way.

These are the fundamental principles of Pestalozzi's theory of intellectual as well as moral education, and I need hardly say that they resolve themselves into the principles of human nature.

But we next inquire, How did he apply them? What was his method? These questions are somewhat embarrassing, and, if strictly pressed, must be answered by saying that he often applied them very imperfectly and inconsistently, and that his method for the most part consisted in having none at all. The fact is, that the unrivalled incapacity for governing men and external things, to which he confessed, extended itself also to the inner region of his understanding. He could no more govern his conceptions than the circumstances around him. The resulting action, then, was wanting in order and proportion. It was the action of a man set upon bringing out the powers of those he influenced, but apparently almost indifferent to what became of the results. His notion of education as development was clear, but he scarcely conceived of it as also training and discipline. Provided that he could secure a vivid interest in his lesson, and see the response to his efforts in the kindling eyes and animated countenances of his pupils, he was satisfied. He took it for granted that what was so eagerly received would be certainly retained, and therefore never thought of repeating the lesson, nor of examining the product. He was so earnestly intent upon going ahead, that he scarcely looked back to see who were following; and to his enormous zeal for the good of the whole, often sacrificed the interests of individuals. This zeal was without discretion. He forgot what he might have learned from Rousseau — that a teacher who is master of his art frequently advances most surely by standing still, and does most by doing nothing. In the matter of words, moreover, his practice was often directly opposed to his principles. He would give lists of words to be repeated after him, or learnt by heart, which represented nothing real in the experience of the pupils. In various other ways he manifested a strange inconsistency.

Yet, in spite of these drawbacks, if we look upon the teacher as a man whose especial function it is, to use an illustration from Socrates, to be, as it were, the accoucheur of the mind, to bring it out into the sunlight of life, to rouse its dormant powers, and make it conscious of their possession, we must assign to Pestalozzi a very high rank among teachers.

It was this remarkable instinct for developing the faculties of his pupils that formed his main characteristics as a teacher. Herein lay his great strength. To set the intellectual machinery in motion — to make it work, and keep it working; that was the sole object at which he aimed: of all the rest he took little account. If he had any method, this was its most important element. But, in carrying it out, he relied upon a principle which must be insisted on as cardinal and essential in education. *He secured the thorough interest of his pupils in the lesson*, and mainly through their own direct share in it. By his influence upon them he got them to concentrate all their powers upon it; and this concentration, involving self-exercise, in turn, by reaction, augmented the interest; and the result was an inseparable association of the act of learning with pleasure in learning. Whatever else, then, Pestalozzi's teaching lacked, it was intensely interesting to the children, and made them love learning.

Consistently with the principles quoted from the "*Evening Hours of a Hermit*," and with the practice just described, we see that Pestalozzi's conception of a teacher's function made it consist pre-eminently in rousing the pupil's native energies, and bringing about their self-development. This self-development is the consequence of the self-activity of the pupil's own mind — of the experience which his mind goes through in dealing with the matter to be learned. This experience must be his own; by no other experience than his own can he be educated at all. The education therefore, that he gains is self-education; and the *teacher is* constituted as *the stimulator and director of the intellectual processes by which the learner educates himself.* This I hold to be the central principle of all education — of all teaching; and although not formally enunciated in these words by Pestalozzi, it is clearly deducible from his theory.

We are now prepared to estimate the great and special service which Pestalozzi did to education. It is not his speculative theories, nor his practice (especially the latter), which have given him his reputation — it is that he, beyond all who preceded him, demanded that paramount importance should be attached to the elementary stages of teaching. "His *differentia*," as Mr. Quick justly remarks, "is rather his aim than his method." He saw more clearly than all his predecessors, not only what was needed, but how the need was to be supplied. Elementary education, in his view, means, not definite instruction in special subjects, but the eliciting of the powers of the child as preparative to definite instruction, — it means that course of cultivation which the mind of every child ought to go through, in order to secure the all-sided development of its powers. It does not mean learning to read, write, and cipher, which are matters of instruction, but the exercises which should precede them. Viewed more generally, it is that assiduous work of the pupil's mind upon facts, as the building materials of knowledge, by which they are to be shaped and prepared for their place in the edifice. After this is done, but not before, instruction proper commences its systematic work.

This principle may find its most general expression as a precept for the teacher, thus: — *Always make your pupil begin his education by dealing with concrete things and facts, never with abstractions and generalizations — such as definitions, rules, and proposition couched in words.* Things first, afterwards words — particular facts first, afterwards general facts, or principles. The child has eyes, ears, and fingers, which he can employ on things and facts, and gain ideas — that is, knowledge — from them. Let him, then, thus employ them. This employment constitutes his elementary education — the education which makes him conscious of his powers, forms the mind, and prepares it for its after work.

We now see what Pestalozzi meant by elementary education. The next question is how he proposed to secure it. Let us hear what he himself says: — "If I look back and ask myself what I have really done towards the improvement of elementary education, I find that in recognizing *Observation* (*Anschauung*) as the absolute basis of all knowledge, I have established the first and most important principle of instruction; and that, setting aside all particular systems, I have endeavored to discover what ought to be the character of instruction itself, and what are the fundamental laws according to which the natural education of the human race must be conducted." In another place he says, "Observation is the absolute basis of all knowledge. In other words, all knowledge must proceed from observation, and must admit of being traced to that source."

The word *Anschauung*, which we translate generally and somewhat vaguely by Observation, corresponds rather more closely to our word Perception. It is the mind's looking into, or intellectual grasping of, a thing, which is due to the reaction of its powers, after the passive reception of impressions or sensations from it. We see a thing which merely flits before our eyes, but we *perceive* it only when we have exhausted the action of our senses upon it, when we have dealt with it by the whole mind. The act of perception, then, is the act by which we *know* the object. If we use the term Observation in this comprehensive sense, it may be taken as equivalent to *Anschauung*.

Observation, then, according to Pestalozzi (and Bacon had said the same thing before him) is the absolute basis of all knowledge, and is, therefore, the prime agent in elementary education. It is around this theory, as a centre of gravity, that Pestalozzi's system revolves.

The demands of this theory can only be satisfied by educating the learner's senses, and making him, by their use, an accurate observer — and this not merely for the purpose of quickening the senses, but of securing clear and definite perceptions, and this again with a view to lay firmly the foundation of all knowledge. The habit of accurate observation, as I have thus defined it, is not taught by Nature. It must be acquired by experience. Miss Martineau remarks: — "A child does not catch a gold fish in water at the first trial, however good his eyes may be, and however clear the water. Knowledge and method are necessary to enable him to take what is actually before his eyes and under his hand;" and she adds, "The powers of observation must be trained, and habits of method in arranging the materials presented to the eye (and the other sense-organs) must be acquired before the student possesses the requisites for understanding what he contemplates."*

It is scarcely necessary to show in detail what is meant by the education of the senses. This education consists in their exercise — an exercise which involves the development of all the elementary powers of the learner. Any one may see this education going on in the games and employments of the kindergarten, and indeed in the occupatious of every little child left to himself. It is, therefore, in the strictest sense of the term, self-education. But it should also be made an object of direct attention and study, and lessons should be given for the express purpose of securing it. The materials for such lessons are of course abundant on every hand. Earth, sky, and sea, the dwelling-house, the fields, the gardens, the streets, the river, the forest, supply them by thousands. All things within the area of the visible, the audible, and the tangible, supply the matter for such object lessons, and upon these concrete realities the sense may be educated. Drawing, again, and moulding in clay, the cutting out of paper forms, building with wooden bricks or cubes to a pattern are all parts of the education of the senses, and at the same time, exercises for the improvement of the observing powers. Then, again, measuring objects with a foot measure, weighing them in scales with real weights, gaining the power of estimating the dimensions of bodies by the eye, and their weight by poising them in the hand, and then verifying the guesses by actual trial — these, too are valuable exercises for the education of the senses. It is needless to particularize further, but who does not see that such exercises involve, not merely the training of the senses, but also the culture of the observing powers as well as the exercise of judgment, reasoning, and invention, and all as parts of elementary education? † It is impossible to exaggerate their value and importance.

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* See some excellent remarks on this subject in Miss Youmans's essay on the culture of the observing powers of children in *Second Book of Botany*. New York.

† I beg very strongly to recommend to all teachers, and to mothers who teach their children, a most valuable little book, written by the late Horace Grant, *Exercises for the Improvement of the Senses*. London.

But elementary education, rightly understood, applies also to the introductory stage of all definite instruction. If we except Pestalozzi's doctrine that all education must begin with the near, the actual, the real, the concrete, we must not begin any subject whatever, in the case of children, with the remote, the abstract, and the ideal — that is, never with definitions, generalities, or rules; which, as far as their experience is concerned, all belong to this category. In teaching Physics, then, we must begin with the phenomena themselves; in teaching Magnetism, for instance, with the child's actual experience of the mutual attraction of the magnet and the steel-bar; Arithmetic must begin with counting and grouping marbles, peas, etc., not with abstract numbers; Geometry, not with propositions and theorems, but with observing the forms of solid cubes, spheres, etc.; Geography, not with excursions into unknown regions, but with the school room, the house, etc., thence proceeding concentrically; Language, too, with observing words and sentences as facts to be compared together, classified, and generalized by the learner himself. In all these cases the same principle applies. The learner must first gain personal experience in the area of the near and the real, in which he can exercise his own powers; this area thus becomes the known which is to interpret the unknown, and thus the principle is established that the learner educates himself under the stimulation and direction of the educator.

You are now, I presume, aware of what Pestalozzi means by elementary education; and you see that it resolves itself into the education which the learner gives himself by exercising his own powers of observation and experiment. The method of elementary education, is, therefore, the child's own natural method of gaining knowledge, guided and superintended by the formal teacher.

This method has been, by Diesterweg, an eminent German disciple of Pestalozzi, strongly distinguished from what he calls the Scientific method — that which is employed in higher instruction, in universities and colleges, and is suitable for learners whose minds are already developed and trained. The Elementary method, he says, is inductive, analytic, inventive (or heuristic, from *εὑρίσκω*, I find out), developing. It begins with individual things or facts, lays these as the foundation, and proceeds afterwards to general facts or principles. The Scientific method, on the other hand, is deductive, synthentic, dogmatic, and didactic. It begins with definitions, general propositions, and axioms, and proceeds downwards to the individual facts on which they are founded.

I will give the substance of his further remarks on the subject.

In learning by the Elementary method, we begin with individual things — facts, or objects. From these we gain different ideas, ideas naturally related to the condition of our powers, or of our knowledge, as being the result of our own personal experience. Such knowledge, as the product of our own efforts, is ours, in a sense in which no knowledge of others can ever become ours; and, being ours, serves as the solid basis of the judgment and inductions that we are able to form,—the method is *inductive* because it begins with individual facts.

The Scientific method, on the other hand, is *deductive*, because it begins with general principles, definitions, axioms, formulæ, etc.; that is to say, with deductive propositions founded on facts which the learner is afterwards to know, not with facts which he already knows. The definitions, etc., are constructed for him, not by him. They are the ready-made results of the exploration of others, not the gains of his own. The deductive method proceeds from the summit to the foundation, from the unknown to the known; the inductive, from the foundation to the summit, from the known to the unknown.

The mind dealing with individual things, seeking to know them, has no choice but to subject them to mental analysis. Every individual thing is an aggregate of elements, which can only be known by disintegration of the compound. Nature presents us with no element whatever alone and simple. The Elementary method, therefore, which requires the learner to perform this disintegration, is *analytic*. In other words, as resting on observation and experiment, it is the method of investigation.

The Scientific method, on the other hand, is *synthetic*. It performs the analysis for the learner, and hands over to him the results. It directs him to re-construct something, the form of which he has not seen, and tells him at every moment where and how he is to place the materials. He does not necessarily know what he is constructing until the complete form is before him. He satisfies the demands of the method, if he obeys the directions given him. He is not required to observe and experiment—*i. e.*, to investigate for himself.

The Elementary method is *inventive* (heuristic). It places the learner on the path of discovery, and by encouraging spontaneity and independence, gives free scope for the exercise of all his powers. It suggests to him new combinations of ideas already acquired, and the solution of difficulties which come in his way.

The spirit of the Scientific method is *opposed to invention*. It didactically furnishes ready-made matter which is to be received, not questioned, and dogmatically prescribes obedience to fixed rules. It consequently checks spontaneity, independence, and invention.

The Scientific method, then, as thus interpreted, though adapted to students of high pretensions, is not adapted to those who are acquiring the elements of knowledge. The mistake, for the discovery of which we are indebted to Pestalozzi, is, that in our ordinary traditional teaching the Scientific method has, unfortunately, come to be employed in our schools for children where the Elementary method alone is natural and suited to the circumstances. Pestalozzi's eminent claim to our gratitude consists in the service he has done to education by "turning the traditional car of school routine quite round, and setting it in a new direction."

I conclude the exposition I have given of Pestalozzi's fundamental principles, by appending a summary of them.

(1) The principles of education are not to be devised *ab extra;* they are to be sought for in human nature.

(2) This nature is an organic nature — a plexus of bodily, intellectual, and moral capabilities, ready for development, and struggling to develop themselves.

(3) The education conducted by the formal educator has both a negative and a positive side. The negative function of the educator consists in removing impediments, so as to afford free scope for the learner's self-development. The educator's positive functions is to stimulate the learner to the exercise of his powers, to furnish materials and occasions for the exercise, and to superintend and maintain the action of the machinery.

(4) Self-development begins with the impressions received by the mind from external objects. These impressions (called sensations), when the mind becomes conscious of them, group themselves into perceptions. These are registered in the mind as conceptions or ideas, and constitute that elementary knowledge which is the basis of all knowledge.

(5) Spontaneity and self-activity are the necessary conditions under which the mind educates itself, and gains power and independence.

(6) Practical aptness, or faculty, depends more on habits gained by the assiduous oft-repeated exercise of the learner's active powers, than on knowledge alone. Knowing and doing (*wissen und können*) must however, proceed together. The chief aim of all education (including instruction) is the development of the learner's powers.

(7) All education (including instruction) must be grounded on the learner's own observation (*Anschauung*) at first hand — on his own personal experience. This is the true basis of all his knowledge. The opposite proceeding leads to empty, hollow, delusive word-knowledge. First the reality, then the symbol; first the thing, then the word; not *vice versa.*

(8) What the learner has gained by his own observation (*Ans-*

chauung), and, as a part of his personal experience, is incorporated with his mind, he *knows*, and can describe or explain in his own words. His competency to do this is the measure of the accuracy of his observation, and, consequently, of his knowledge.

(9) Personal experience necessitates the advancement of the learner's mind from the near and actual, with which he is in contact, and which he can deal with himself, to the more remote; therefore, from the concrete to the abstract, from particulars to generals, from the known to the unknown. This is the method of elementary education; the opposite proceeding — the usual proceeding of our traditional teaching — leads the mind from the abstract to the concrete, from generals to particulars, from the unknown to the known. This latter is the Scientific method — a method suited only to the advanced learner, who it assumes, is already trained by the Elementary method.

A
PREFACE AND SUPPLEMENT
TO AN
ESSAY ON THE CULTURE
OF THE
OBSERVING POWERS OF CHILDREN.

BY ELIZA A. YOUMANS.

PREFACE

TO

THE ENGLISH EDITION.

THE EDITOR'S ACQUAINTANCE with the valuable treatise which he now brings before the English public is of recent date. He had undertaken to write a brief paper for the Leeds Meeting of the Social Science Association on "The Teaching of Elementary Science as a Part of the Earliest Instruction of Children;" and had completed the arguments and illustrations by which he endeavored to show that, in the true order of things, the earliest formal instruction of children should be a *continuation* of that which they had already unconsciously received from Nature and Fact, when Dr. Youmans, of New York, put into his hands the "First Book of Botany," and the little treatise, which is here republished, "On the Culture of the Observing Powers of Children," written by Miss Youmans. He was at once struck with the remarkable correspondence between the views taken by Miss Youmans and those which he had presented in his own paper, and proportionally interested in the fact that these views had been realized in successful practice. It therefore occurred to him that he should be doing a service to the cause of education by bringing them under the notice of English teachers, and of all who take an interest in the improvement of elementary instruction. He has a profound conviction — which many others share with him — that what is demanded by the present times is not so much extended machinery as better teachers — teachers more thoroughly acquainted with the nature of the mind with which they are professedly dealing, and capable of making their knowledge of the processes of education more productive in results; and moreover, that the improved teaching which is needed, must begin at the beginning. As things are, we adopt conventional opinions respecting the essentials of instruction — frequently confounding the means with the end — and entrust the most delicate and difficult part of the process — the early development and training of the mind — to teachers who have no other idea of teaching than that it is a sort of mechanical grinding, which is somehow or other to produce the desired result. We all recognize the usual product of such grinding in countless examples of children exposed to it, who grow up to manhood and pass their lives in the possession of eyes that do not see, ears that do not hear, and minds that have never been taught to think. The teaching, however, which ends in such results as these is, to speak strictly, no teaching at all.

It fails altogether as an agency for quickening intelligence through the acquisition of knowledge. The teacher has not done what he engaged to do. He professed to be an artist aiming to secure, through the resources of his art, a definite end; that end he has not secured. He undertook — what Nature left alone does not undertake — to teach his pupils not only to think, but to think with a fixed purpose in view; not only to set their minds in motion, but to direct that motion so as to make it effectual for (1) the acquisition of exact knowledge, (2) the formation of good mental habits, (3) and consequently, the attainment of a consciousness of power applicable to all cases of mental action. His work has proved inefficient in all these respects, and he has therefore failed in the very object of his existence.

The didactic method — the method of endless telling, explaining, thinking for the pupil, and ordering him to learn — has had its day. It is, then, worth while to consider whether it may not be superseded by one which recognizes the native ability of the human mind, under competent guidance, to work out its own education by means of its own active exercise.

Miss Youmans' method, by providing for the exercise of the pupil's own mind on concrete facts, which are to be observed, investigated, judged of. and described by himself, is an obvious recognition of this principle; and in carrying it out she supersedes "the usual desultory practice of object-teaching in noting the disconnected properties of casual objects," by "training him (to use her own words) not only to observe the sensible facts, but constantly to put them into those relations of thought by which they become organized knowledge."

In general, then, the purpose of this little book is to give the elementary teacher an enlarged and enlightened view of his proper functions, to fix attention on principles rather than routine, to supersede didactic cramming by systematic mental training; and, in short, to place the noble art of teaching upon a solid foundation.

The editor has added a few notes by way of enforcing the author's general argument, and in his "Supplement" has endeavored to illustrate a principle to which he attaches great importance, as the key-note to the art of teaching; namely, that the process by which the pupil learns being essentially one of subjective, conscious, self-instruction, the teacher's counterpart, conscious objective process, ought always to recognize this fact; that, in short, only in proportion as the teacher aids, without superseding, the pupil's own efforts to teach himself, will he be successful in his teaching.

From a conviction, moreover, that the study of a descriptive science like Botany does not sufficiently develop the instinct for experiment, nor supply a training in the doctrine of force, he has shown, by a typical lesson, how the elements of mechanics may be learnt by young children through their own observation and experiments, without explanations from the teacher — the learners being considered in the light of investigators, seeking to ascertain at first hand facts and their interpretation.

4, KILDARE GARDENS,
May 1*st*, 1872.

SUPPLEMENT BY THE EDITOR

ILLUSTRATING THE FOREGOING PRINCIPLES AND APPLYING THEM TO THE ELEMENTARY STUDY OF MECHANICS.

IT will have been seen that the special characteristic of the method of this book is, that the author insists on the principle that all elementary instruction which is intended to train the mind must be based on objective, concrete fact, and provides no other basis. The facts themselves, not the explanations, deductions, or comments of others upon them, are to be brought at first hand into immediate contact with the pupil's mind. In the natural order of things, the fact comes first, the comments afterwards, and the child, in his acquisition of knowledge, should follow the natural order. This is the historical method, the method of the investigator, who gains his ends by observation and experiment, acquiring knowledge by the exercise of his senses, by analysis and comparison, and testing it by synthetical applications. The child, too, may be regarded as an explorer or investigator, who is to proceed by the same method. He, too, can gain knowledge by observation and experiment, and that only is truly his own which he gains by these means.

This proposition will be considered by many teachers as needing proof. The remark is, however, intended to apply only to the *most elementary instruction*, as a part of a system of *mental training*. The purpose of such instruction should obviously be to impress upon the pupil's mind clear and definite ideas, however few, and to foreclose his mind, for the time being, to all others.* The quantity of knowledge that he gains under the process is of small importance compared with its quality, and its quality depends upon the manner in which he gains it. What he gains at first hand, by his own mental labor, and what he acquires as the result of other people's labor, may both become his own property, but they are different in their nature, and are held on totally different tenures;

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* "L'esprit de mon institution n'est pas d'enseigner à l'enfant beaucoup de choses, mais de ne laisser jamais entrer dans son cerveau que des idées justes et claires." — ROUSSEAU, *Emile.*

and it is maintained that the child *under training* is only concerned with the former. He is to learn how to acquire property himself, that he may know the value of property in general, and may be able to appreciate the various methods by which others acquire it. In a similar way, the mechanic learns his art by continually handling his tools, until having gained experience by daily practice, he at length becomes capable of appreciating the finished and elaborate work of his more advanced fellow-laborers. His competency, however, to form a mature judgment of their performance, and to do what they do, is founded essentially on his own previous knowledge and experience. It is in this sense that the assertion is made, that in the case of a child under elementary training, that knowledge only which he gains by his own observation and experiment is truly his own.

The time of course comes when he must receive many things on the authority of others, as, for instance, when he learns Geography and History. These subjects do not, indeed, consistently with the views here maintained, enter into the curriculum of the *earliest* elementary instruction, which should be strictly confined to matters on which the pupil can exercise his own powers of observation and experiment. When, however, the time does come for learning them, it will be found that the child furnished with a substratum of knowledge gained by his own efforts, will be in a far better condition for receiving and appropriating that supplied him by others than one who has not had the previous training.

It may, however, be further objected, that it is unreasonable to require the pupil to discover for himself what has been already discovered by others, and lies ready at hand. The objection would be valid if it were true that he *could*, while yet a novice in learning, in the true sense of the term, appropriate what another has gained; but the fact remains that the child's mental appropriation of objective knowledge can be secured only by certain subjective processes which another can no more perform for him, than walk, sleep, or digest for him. That only, therefore, in an educational sense, is knowledge to us which we have gained through the working of our own minds. We do indeed please ourselves with the fancy that we can assume as our own the vast field of science which, we have, as a people, inherited; but after all, it is an ultimate fact of human nature, that there is no "common measure" between a nation's progress in knowledge and an individual's: so that, however large may be the inheritance bequeathed to us, we can enter on it in no other way than that by which it was first acquired — the way of observation and experiment. Whatever is acquired by any other means is of the nature of cramming, and has nothing in common with the true *elementary culture* of the mind.*

These considerations help us to define the relation between the material of instruction, the learner, and the teacher. The material should be objective, concrete fact; the learner, one who applies his senses, his powers of perception, apprehension, analysis, comparison — his whole mind, in short — with a view to ascertain the nature and phenomena of the fact, by interrogating it in every possible way; and the teacher, one who, recognizing and understanding the learner's process of investigation, aids him in it by every means which does not interfere with it. He does not, therefore, tell his pupils that this object is hard, that soft; he makes them feel it themselves; he does not explain that this object has a certain external relation to that; he places them in juxtaposition, and invites comparison; he directs them to congregate particulars, and at the right time calls for generalization and classification; he does not point out that this is a cause, and that an effect, but prompts them to make the experiments which suggest the relation; he does not anxiously correct their blunders, but, either at the moment or subsequently, takes care that they are corrected by themselves; he gives them no technical names until they know the things or phenomena which require to be named; and finally, distrusting their memory, he often repeats his lessons in order to deepen impressions and prevent the loss of what has once been acquired.

From this enumeration of the several functions of the learner and teacher, it is clear that the former is an investigator engaged in teaching himself by means of concrete facts, and that the latter is a guide, director, or superintendent of the process by which the pupil learns.

The views of the respective functions of the learner and teacher will of course hardly satisfy those who assume that every one who knows a subject is competent to teach it: all experience, however, is against this assumption. The teacher should indeed thoroughly know his subject. This knowledge will guide him in bringing the object to be learned in contact with the pupil's consciousness by the questions he asks, and is, moreover a guarantee that he has himself had experience of the subjective process of learning, but is no guarantee that he has a right conception of his proper function as a teacher, or a conscious knowledge of the process by which all minds learn. He may know his subject, but be entirely ignorant of the best means of making his pupils know it too, which should be the end of all teaching. The question at issue resolves itself, indeed, into that of the means by which knowledge is naturally gained; and the main point in the inquiry is, How is all knowledge which we can truly call our own obtained? Does a child come to know a flower, for instance, because his teacher, having exercised his mind upon it, knows it, or because the child himself has exercised his own mind upon it? Even if we allow — which we do not — that the child is incapable of seeing the flower aright, of discriminating between its parts, and appreciating their relations by his own powers of mind, it must be admitted that the ultimate act which makes the idea a mental possession is, and must be, the child's own, not the teacher's. But indeed all the processes of perception, observation, comparison, reasoning, judgment, by which solid knowledge is gained, are so many means by which the investigating mind works in attaining its object, and can only be performed by the learner himself. The teacher who intrudes the knowledge he has gained by means equally accessible to the child, does a work of supererogation, and gives at second hand what the learner would better gain at first hand, and by so doing supersedes the more valuable teaching given by the fact or object itself. In learning what an object is, the object itself is the best possible teacher. The lessons it gives are clear, forcible and definite, and stamp themselves directly on the mind. Those substituted for them by the professed teacher, may be quite otherwise, inasmuch as if he learned them originally from the object itself, he may not have learned them correctly, or if he merely transmits impressions which have passed through other minds without reference to the original teacher — the fact or object — he may convey error instead of truth to his pupil. No account, in short, can be given by another, of the nature of an object equal in vividness, force, and truth, to that which the object itself can give. But further, the teacher who assumes that his best service to his pupils consists in doing their proper work of observation, &c., for them, not only does what is unnecessary, but what may be positively injurious. His professed object, as a teacher, is to educate as well as to instruct; to train the faculties through the process of instruction.* But he can train only by calling into exercise the pupil's own powers. The substitution of his own thought for the pupil's, except as a means to this end, tends to defeat the object in view. All explanations, therefore, by the teacher, of relations which are obvious and patent in the things themselves, supersede the pupil's own mental activities, and hinder, to some extent, that exercise of mind which is essential to development and training. Explanation is "flattening," "making level," or "clearing the ground," so as to produce an even surface, and as applied to teaching, signifies removing obstructions out of the way. This work, however, as being, in our view, the only means by which the pupil's mind is to be trained to the consciousness of its powers, belongs to the learner, not to the teacher, and the teacher who does it for him injuriously interferes with, and in fact defeats, as we have just said, the object in view. The human mind, which is naturally endowed with a capacity for observing aggregates, is also endowed with a capacity for disintegrating them, and detecting the relation of the parts to the whole, and further, with a capacity for reasoning on these relations and forming a judgment upon them. It has, moreover, the ability to apply the knowledge thus gained to the acquisition of more — to use the known to interpret the unknown. All these processes are essentially of the nature of explanations, but then they are explanations which result from the working of the learner's own mind on the matter of study, not from the working of the teacher's mind; and to return to the former assertion — the teacher who intrudes his own explanations injuriously interferes with the machinery, and hinders it from securing its best products. The teacher's whole business, in short, is to teach his pupil how to think, and this can only be effected by making him do all the thinking himself, "absolutely without aid" (see Dr. Temple's remark below), not thinking for him.[*]

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* The writer is anxious to guard against any misconstruction of his meaning in reference to "cramming." He has already denounced its "unlawfulness" as a part of elementary training, but he admits, of course, its lawfulness and indeed necessity, in a more advanced stage of instruction, and in the business of life. What he insists on is that by enfeebling the growing powers it is antagonistic to mental culture, and, moreover, that when it is necessary, the cultivated mind will appreciate in a higher sense and appropriate far more effectually the knowledge gained by others, than the mind which has been accustomed from the beginning blindly to receive and adopt the conclusions of others as its own. In other words, the mind that is not used to cramming will cram to far better purpose when the occasion arises than that which is; and will besides, more competently deal with general propositions framed by others from having been employed in forming such propositions itself.

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* It may be worth while to remark, as the point is often misapprehended, that Education (from *educare*, a frequentative of *educere*, to draw forth) is the drawing forth, by *repeated acts*, of the pupil's powers, the training of them to their proper work, and that Instruction (from *instruere*, to place materials together *for a definite end*) is the orderly placing of knowledge in the mind. Hence, only an instructor scientifically equipped for his profession is at the same time an educator. The teacher who merely gets his pupil to accumulate disconnected bits of "information" about all sorts of subjects is no instructor, and, therefore, no educator, in the true sense of the terms.

It scarcely needs to be pointed out, that the question of the necessity of explanations in elementary teaching involves that of the subjects and order of studies. "If the subject is unsuited to the child's stage of instruction, or if, instead of presenting him with facts which he can understand, we force upon him abstractions which he cannot, we create the need for explanations." He can understand concrete facts, by applying his natural faculties of observation to them, but he cannot understand general principles framed by others upon facts which he does not know. The recognition of this principle furnishes a test of the suitability of any given subject for the earliest stage of elementary instruction. Those subjects alone are suitable which admit of independent investigation, which require no evidence but that of the senses, and can therefore be brought into immediate contact, without the descriptions and explanations of others, with the learner's own mind. In the progress of instruction, the knowledge gained by others — as in Geography and History — will fitly take its proper place; but in the first instance and with an especial view to training the mind, the pupil's knowledge should be all his own — the sole product of his own thought. Facts, then, and phenomena — the facts and phenomena of the material world — are the proper food of the mind learning to think, and it is the perception and appreciation of this principle which constitutes the merit of Miss Youmans' method of teaching Botany.

It is important, however, to remark, that, valuable as the study of Botany is as a means of cultivating the observing powers, it fails to secure all the elementary training of which children are capable. It leaves altogether uncultivated the instinct of experiment, which equally with observation, is an indispensable agent in the acquisition of physical knowledge. A child may become a proficient in Descriptive Botany and remain ignorant of the action and reaction of forces, and of the relation between cause and effect. Yet this knowledge as a means of quickening mental effort is of even more value than any that can be obtained from observation alone, and tends more directly to form the scientific mind. Children are always delighted with experiments, especially with those which they make themselves. They like to set objects in motion, and to watch the results.

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[*] There is abundant authority for the correctness of these views on the value of the learner's self-tuition. "All the best cultivation of a child's mind," says Bishop Temple, "is obtained by the child's own exertion, and the master's success may be measured by the degree in which he can bring his scholars to make such exertions absolutely without aid." Rousseau, too, recommending self-teaching, says, "Forcé d'apprendre de lui-même, il (the pupil) use de sa raison et non de celle d'autrui, car, pour ne rien donner à l'opinion, il ne faut rien donner à l'autorité; et la plupart de nos erreurs nous viennent bien moins de nous que des autres. De cet exercice continuel il doit résulter une vigueur d'esprit semblable à celle qu'on donne au corps par le travail et par la fatigue. Un autre avantage est qu'on n'avance qu'à proportion de ses forces. L'esprit, non plus que le corps, ne porte que ce qu'il peut porter. Quand l'entendement s'approprie les choses avant de les déposer dans la mémoire, ce qu'il en tire ensuite est à lui; au lieu qu'en surchargeant la mémoire à son insu on s'expose à n'en jamais rien tirer qui lui soit propre." Again: "Sans contredit on prend des notions bien plus claires et bien plus sûres de choses qu'on apprend ainsi de soi-même que de celles qu'on tient des enseignements d'autrui: et, outre qu'on n'accoutume point sa raison à se soumettre servilement à l'autorité, l'on se rend plus ingénieux à trouver des rapports, à lier des idées, à inventer des instruments, que quand, adoptant tout cela tel qu'on nous le donne, nous laissons affaisser notre esprit dans la nonchalance, comme le corps d'un homme qui, toujours habillé, chaussé, servi par ses gens et traîné par ses chevaux, perd à la fin la force et l'usage de ses membres." —*Emile.*

The elementary discipline, then, which is to be a continuation of Nature's method, should provide a systematic training in the doctrine of forces.* This training will be one day recognized as the true basis of that Technical Education which is the desideratum of our times.

We are not yet furnished with a systematic arrangement of means and agencies for such training, but in the meanwhile a typical and theoretical specimen is here given of the manner in which instructions of this kind might be conducted; which will also serve as an illustration of the principles already insisted on.

It may be premised that the object of this specimen of a lesson is to show: —

(1.) That the pupils throughout the lesson are learning, *i. e.*, teaching themselves by the exercise of their own minds, without, not by, the explanations of the teacher.

(2.) That the pupils gain their knowledge from the object itself, not from a description of the object furnished by another.

(3.) That the observation and experiment by which their knowledge is gained, are their own observation and experiment — made by their own sense and by their own hands; as investigators seeking to ascertain for themselves what the object before them is, and what it is capable of doing.

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* That such knowledge is within the comprehension of children is shown with admirable tact and skill in Miss Edgeworth's "Harry and Lucy," as well as by the numerous actual experiments in education recorded in Mr. Edgeworth and his daughter's joint work on "Practical Education." It is much to be regretted that these valuable works, superseded by none in recent times, are apparently falling into oblivion. When the nature and requirements of elementary training are better understood, and our traditional routine submitted to the test of educational science, teachers will study with deep interest the numerous experiments in education which are minutely described in them, and recognize the sterling merits of the Edgeworthian method.

(4.) That the teacher recognizes his proper function as that of a guide and director of the pupil's process of self-teaching, which he aids by moral means but does not supersede by the intervention of his own knowledge or explanations.

Suppose, then, a large working model of the pile-driving machine placed in view of the whole class. As it is well known, it is not necessary to describe it. The resistance of the earth may be represented by a socket made of boards connected by strong springs.

I. The teacher simply remarks that the object before them is called a "machine," and that its purpose is to drive the pile into the socket which represents the earth. He also tells them the names (merely as conventionalities which they cannot find out for themselves) of the "monkey," the "clutch," the "pulleys," &c. The children are eager to see what the machine can do. He therefore directs two of them to lay hold of the cords and pull up the weight or "monkey." This they do gradually until the clutch relaxes its hold, and the weight falls down on the head of the pile. The weight is then replaced in its original position, and all the children in succession make the experiment. This employment of their own powers involves a personal experience of resistance to muscular effort, and a rudimentary idea of force.

The teacher next directs them to measure the height from which the weight falls, as well as the height of the head of the pile from its insertion in the socket. He also detaches the monkey from the clutch, directs them to weigh* it and he records the result on the blackboard.

He then replaces the weight in its original position, and directs the children to repeat the experiment; but this time the height of the pile is measured after the fall of the monkey, and the difference recorded on the blackboard. "The iron weight of — lbs. drives the pile into the earth — inches."

He next substitutes for the iron weight masses of equal volume made of lead and wood, directing the children in each case to weigh the several masses and recording for them the several results of the impact.

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* Arrangements for accurately weighing and measuring should always form a part of the school apparatus, and should be used not for, but by the pupils. They should also be practised in poising weights in their hands, and in conjecturing heights and distance by the eye, and then comparing the mental surmise with the facts, as ascertained and confirmed by actual experiments. Much valuable mental discipline, as well as preparation for the business of life, is involved in processes of this kind. The vague evidence often given in courts of law on such points, show how much they are neglected in early training.

Teacher. Which weight drives the pile most, which least?

Answer. The leaden one most, the wooden one least.

T. Why?

A. Because the leaden one is the heavier and the wooden one the lighter.

T. How many inches in each case?

A. The leaden one — inches, the wooden one — inches.

T. What are the weights of each?

A. The leaden one weighs — lbs., the wooden one — lbs.

T. How do you state the result?

A. The leaden weight drives the pile twice as deep as the wooden one.

T. Measure exactly the leaden and the wooden weights: the length, height, and thickness of each. What is the result?

A. They are exactly the same size.

T. We will say that they are of equal *volume;* yet being of equal size or volume, and falling from the same height, you say that the leaden weight produces twice as great a result as the wooden one.

A. Yes, because it is twice as heavy. We found that it weighed twice as much.

T. That is, as you told me, the leaden monkey weighed, say 20 lbs., and the wooden one 10 lbs., both having the same volume.* How do you account for this?

A. We don't know how it is.

T. Well, here is some wool. Weigh out two parcels of it which shall be exactly equal to each other. Take one parcel and squeeze it gently into a ball, squeeze the other parcel also into a ball tightly, so that the one ball shall have as nearly as possible double the volume of the other. What do you notice?

A. That the quantity of wool is in both cases the same, but that in the one case it is packed twice as closely as in the other, so that it occupies only half the space.

T. We will call the wool, as being something that we can see, touch, and smell, *matter*, and the "close packing," *density*. How do you apply these terms?

A. The quantity of matter in the two balls is equal, but the density of one is twice as great as that of the other.

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* The teacher may legitimately aid his pupils by summing up and keeping before them the results they gain; that is, in the intellectual chase in which they are engaged, he may, if he thinks fit, carry the game-bag for them. This will often be found a great support to the attention.

T. Now returning to the case of the leaden and wooden weights, how do you account for the fact that though equal in volume, the one weighs twice as much as the other?

A. In the leaden weight, the matter is twice as closely packed, or twice as dense as in the wooden one.

T. Now again. What was the effect of your squeezing the parcels of wool?

A. To bring the bits of wool closely together.

T. Call these "bits" *particles*. Why is it possible to bring them closer together?

A. Because there are spaces between the particles.

T. These spaces are called *pores*, and the fact that there are such pores, is called *porosity*. What relation has this quality to that of density?

A. It is the opposite to *density*. The more dense anything is, the fewer pores it has; the more pores it has, the less dense it is.

T. How can you express this generally?

A. The greater the porosity, the less the density; the greater the density, the less the porosity.

T. Terms like density and porosity thus related to each other, are called *correlative*, and we may therefore speak of the *correlation* of density and porosity.

II. The teacher now shifts the beam; arrangements having been previously made for raising or lowering it. The experiments are repeated. The beam is gradually lowered, and the results recorded as before, until there is no height to fall from; the weight simply resting on the head of the pile.

T. What did you observe as the height was gradually lessened?

A. That the pile was less and less driven down.

T. Why was this?

A. Because the monkey did not fall so far.

T. But if the weight is the same, why do the results differ?

A. It is the falling of the weight that makes the difference.

T. This "falling" is called *motion*—what is it, then, which produces the result?

A. The motion of the weight.

T. Let us call the weight as producing an effect in driving the pile, a *force*. What is it when actually driving the pile?

A. A moving force.

T. A moving force is called *momentum*. What is it made up of?

A. Motion and weight.

T. In what way could you drive the pile down without the motion of the weight?

A. By making the weight a good deal heavier.

T. What advantage, then, is gained by making the smaller weight do the work?

A. It is much more convenient; the smaller weight does as much work by its motion as a larger one would do without motion.

The teacher now detaches the monkey and substitutes one-half the weight; he directs the pupils to experiment with this as they did with the first, and to measure the result; then to attach the original weight so that it may fall from half the original height, and to compare the results.

T. What is the momentum in these two cases?

A. The same.

T. State the result.

A. The weight of — lbs. falling from a height of — feet produces the same effect as the weight of — lbs. falling from half the height. The greater fall makes up for the smaller weight.

T. Mention other instances of momentum.

A. A battering ram, a cannon-ball, a marble shot at another, a stone breaking a pane of glass, a hammer driving a nail, &c.

T. You spoke just now of the falling weight as a "moving force." May the weight acting by itself without motion also be a force?

A. Yes; if it were placed upon an apple, it would crush the apple.

T. What other kinds of force can you mention?

A. The wind is a force when it blows down a tree; water is a force when it moves the water-wheel of a mill; gunpowder is a force when it explodes and bursts a rock to pieces, or when it drives a cannon-ball through the air; our strength is a force when we pull up the monkey, &c.

III. The teacher now directs the pulleys to be removed and the weight to be pulled up without them. The children are at once sensible of the increased difficulty.

T. What difference do you now perceive in your pulling?

A. We are obliged to pull harder than we did before.

T. Why is that?

A. Because the rope rubs on the edge of the board, which does not give way; when it moved on the pulleys, the pulleys gave way.

T. This rubbing is called *friction.* Could you lessen it without using the pulleys?

A. Yes, by putting some grease on the edge of the board.

T. Try that.

The experiment is made accordingly, and the rope of course moves more easily; the pulleys are then replaced.

T. What, then, is the use of the pulleys here?

A. By giving way they lessen the amount of friction.

IV. The teacher restores the apparatus to its first condition, and directs the children to notice especially the fall of the weight.

T. Why does the weight fall?

A. Because the clutch opens and lets it go.

T. But why does it *fall?*

A. Because every heavy body falls down of its own accord to the earth.

T. Give other instances of falling bodies.

A. If we throw a stone up into the air it falls down, if we let go when we are climbing up a tree we fall down, &c. The earth seems to pull everything down to itself.

T. This pulling force is called *gravitation*, or the *attraction* of *gravitation.* What makes the weight fall when it is let free?

A. The attraction of gravitation.

T. Describe it in this case.

A. The earth attracts the weight, and the weight falls by the attraction of gravitation.

T. Look carefully at it as it falls. Does the attraction increase or lessen?

A. It seems to increase. The weight falls faster and faster.

T. Swiftness of motion is called *velocity.* How do you apply the term here.

A. The velocity increases as the weight gets nearer and nearer to the earth.

T. A velocity which increases is said to be *accelerated.* How do you apply the term to the case before us?

A. The attraction of gravitation causes a body left free to fall, to fall towards the earth with accelerated velocity.

T. But how much is the velocity accelerated?

A. We cannot tell, the weight moves so very fast.*

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* The teacher may, if he sees fit, put many more questions on the phenomena of falling bodies, and even introduce Attwood's machine to the notice and investigation of his pupils, who will be found quite capable of comprehending its action. In reply to an objection that

V. *T.* A thing that makes a change in another thing is called a *cause*, and the change itself is called an *effect*. What instances of cause and effect do you perceive in the action of this machine?

A. The pulling of the rope causes the weight to rise, the letting go of the weight causes it to be left free, the attraction of gravitation causes it to fall, and the momentum of the weight causes the pile to go down.

T. What was the first cause which led to all the others?

A. The strength of our arms.

T. Tell me the causes separately.

A. 1. The strength of our arms. 2. The setting the weight free. 3. The attraction of gravitation which gave the weight its momentum.

T. Now tell me the effects separately.

A. 1. The lifting of the weight. 2. The setting the weight free. 3. The blow upon the head of the pile.

VI. *T.* Now I will read to you from a book some descriptions, which are called *definitions*, of a few of the special words called *technical terms*, which we have been using.

1. "A machine is a contrivance for applying or regulating a moving power or force." Explain this by what you know.

A. The moving force is the weight falling down; it is applied to the head of the pile; and it is regulated by making the weight heavy enough to do the work well, and by letting it fall exactly on the top.

T. Here is another definition.

2. "The force exerted by a mass of matter in motion is called, in mechanics, momentum or moving force." Explain this.

A. The mass of matter in motion is the weight, and it exerts its force in driving the pile.

T. Here is a third definition.

3. "Friction or rubbing is the resistance which a moving body meets with from the surface on which it moves." Explain this.

A. The friction of the rope against the board when the pulleys were taken away prevented us from pulling up the weight easily.

The teacher may give at will more or fewer of these definitions, but will require in each case that the explanation of the pupil shall be founded on the facts that he knows. This condition is indis-

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has been made to the use of costly machines in common schools, the writer would suggest that they might be let out on hire, and passed on from school to school as required. The expense in this way would be trifling, while the benefit would be very great.

pensable. A definition founded on facts which he does not yet know, is no definition to him. This consideration suggests the expediency of endeavoring to obtain from him in his own language, however imperfect, the expression of the ideas, which he has gained from the facts with which he has been dealing, *before* the definitions of others, founded on the same or similar facts, are brought under his notice. The teacher closes the lesson by directing every pupil to write down the definitions, as he may remember them, each on a separate page of a book set apart for the purpose, with a view to placing under them the new cases which may afterwards occur, as additional illustrations. He adds, in dismissing the class: "Let each one contrive some other machine for doing the same work, and bring a model or drawing of it for the next lesson."

The next lesson will consist of a repetition of the main points of the first, with an examination into the action of the clutch, more experiments on velocity, momentum, friction, &c., as shown in other machines and in common operations known to the children. The products of their own invention will then be brought forward and submitted to the criticism of the class, guided by the teacher, who, in his turn, may give his own inventions, and submit them to criticism. The definitions, too, will be repeated and tested by the facts. In the third lesson the teacher, *having removed the machine out of sight*, will examine the class upon the *ideas* they retain of its form, operations, &c., as well as on the technical terms which they have learnt, and finally exhibit a well-executed drawing of the machine, which is forthwith to take its place on the walls of the school-room.

The first sentence in the language of machines has now been to some extent learnt — learnt as a whole and in its principal parts; its clauses, many of its words, and some of its letters appreciated. It is the *point de départ* from which the pupil sets out in the acquisition of fresh knowledge of the general subject, and to which all that knowledge is to be continually referred. It is the "quelque chose" of Jacotot's famous maxim, "Apprenez quelque chose et rapportez-y tout le reste."

In reflecting on the principles involved in this lesson, we notice,

1. That the learner has throughout had his mind brought into direct contact with material substances and phenomena at first hand; these he has himself seen, handled, and experimented upon, and in so doing has gained mental cognitions and experiences more

valuable than any that he could have gained by descriptions of them or commentaries upon them furnished by others.

2. That the method he has employed is the true method of analytical investigation, and proceeds from the whole to the parts, from the complex to the simple, and not *vice versâ*.

3. That by being an observer, explorer, and experimenter on his own account, examining things with his own senses, and employing his own intellect directly upon them, the ideas that he gains respecting them are clear and definite as far as they go, and serve as a solid substratum for those which he is afterwards to associate with them.

4. That he learns to use words as the symbols of things that he knows, technical and conventional terms being supplied, when, and not before, they are needed to facilitate the operations of the mind.

5. That the habits of mind acquired by the process of teaching himself in this special case, are such as prepare him for independent mental self-direction, and therefore for the successful study of other subjects, literary as well as scientific.

We also notice (6) that the teacher while really the mainspring of the educational machinery — all along supporting its movements by his moral and intellectual influence — acts strictly as the superintendent of the processes on which its efficiency depends. He removes, when necessary, hindrances out of the way, and places the workers in the best position for accomplishing their object, but he carefully abstains from doing any part of the work for them. He directs their action but does not interfere with it. He therefore explains nothing, and tells nothing, except technical terms, which, as being conventional, the children could not find out for themselves. He uses no book, but treats the machine as a book, which they are to learn to read for themselves under his direction.

Opinions will of course differ as to the value of this typical first lesson in mechanics. It may be said that the information gained by it is very small, and might more easily have been given by the teacher. A full reply to this objection would be a mere repetition of the principles already stated. It must, however, be remembered that mental training — the direct object in view — does not consist in giving information, but rather in stimulating the mind to gain information for itself. The act of gaining it by a mental effort involves and *is* the training of the faculties. In the lesson just described, whatever knowledge was gained was the direct result of the pupil's own observation and experiment, through the teaching of the machine — not through the didactic teaching of the instructor. The pupil was an original investigator, applying all his powers to ascertain what the machine was and what it could do, and the teacher was a superintendent or director of the process, anxious to make it as fruitful and efficient as possible. As the head teacher — the machine itself — was at hand, ready to interpret itself in the expressive and forcible language of facts, the subordinate recognized his own proper function, as the director of the process of interrogation, but not the interpreter of the answers. To have assumed this office would have been an injurious interference with the instruction efficiently conducted by his principal. We see, then, in this lesson a typical specimen of a process by which the pupil teaches himself, that is, learns without the explanations of the teacher, and in gaining a certain quantity of knowledge gains also the power of acquiring more.

In some such way as this, maintaining the principle, while varying the form of its application, it is presumed that a solid foundation will be laid for a real training of the mind — a training which will be the best preparation for further instruction, not only in science but also in literature.

It will be thought by some who may accept generally the foregoing principles that a needlessly difficult illustration of the theory has been selected, and that it would be better to introduce the subject of mechanics by taking for the first lesson simple levers, &c., and so proceeding from the simple to the more complex — by "beginning," in short at what is usually called "the beginning." The general reply to this objection is (1) that the investigator, inquiring into a new science, strictly speaking, does not know what the beginning is, and cannot, therefore, commence with it — and (2) that the fundamental point in the teaching here recommended is that it requires the pupil to be considered as an investigator. In other words, the process is analytical, not synthetical, and the pupil a student of inductive, not of deductive, philosophy. His business is to get an accurate knowledge of the facts before him with the view of framing them, as he proceeds, into general propositions, but the logical co-ordination of these propositions into a system is, while he is yet in his noviciate, no part of his business. As he advances in his course, he will rise to higher and higher generalizations, and see more and more clearly the relation of the principles that he has gained, and at last, when he is master of his subject, will arrive at the beginning — and, may, perhaps, write a treatise upon it in which all the propositions which constitute the science are logically arranged. Such a treatise, however, will in no sense represent the process by which he gained his knowledge, but rather its exact converse. Hence, a book of this kind is wholly unsuited to the wants of a young investigator who is to gain knowledge as the author gained it. Such books are, however, on account of their logical completeness, often put into the hands of children by teachers ignorant of the science of education, who do not perceive that the very characteristics which give them their value in the eyes of those who are already educated render them unfit for the use of those who are learning how to learn. It is hardly too much to say that scientifically constructed school-books, whatever be their intrinsic merit as compendiums of knowledge, ought to be reckoned among the hindrances, not the aids, to early education, and indeed that their real fitness for their purpose is in the inverse ratio of their logical completeness. The knowledge displayed in them may be accurate, the propositions they present unimpeachably expressed — both the matter, in short, and the manner admirably adapted to the prepared mind — and yet they may be, and often are, wholly unsuited to the mind under training. The food is of the best quality, and is artistically cooked, but it is so concentrated that the youthful stomach cannot possibly digest it. The purveyor in this case is surely somewhat to blame for arrangements ending in such results. The fact is that he has not truly understood the nature of the apparatus which he was directing, and nothing short of a radical change of plan will enable him to correct his error. What this radical change should be has been already indicated.

It appears, then, that scientifically constructed treatises which begin at the beginning — a beginning which is really the end of the investigator's labors — are unsuited to the wants of a child who is to be himself an investigator, and who, in pursuing his process of self-instruction, can only advance from the concrete to the abstract, from particulars to generals, from instances to rules, and who, moreover, has no choice but to advance from the whole to the parts, and then conversely from the parts to the whole. This is in fact Nature's method. She does not commence with the elements — with A B C. She supplies no grammar of the senses. She teaches language by giving whole sentences or whole words, and physics, by presenting wholes, aggregates, or complex facts, and stimulating the analytic faculty to resolve them into their parts or individual phenomena. The justification, then, for beginning the instruction in mechanics by a machine rather than by the elements of which it is composed, by concrete facts rather than abstractions, is seen to be inherent in the nature of the process recommended. If the child is to investigate facts at first hand, we must imitate Nature by giving him something to investigate which will exercise his analytical powers; something divisible into parts or elements — which, after due recognition as individual elements, will be traced in the composition of other wholes. On the same principle, if he is to learn to frame general propositions himself, he must commence by knowing the facts which they are to express — that is, by induction of particulars. But this practice in forming inductions of his own will be a powerful aid to his understanding the inductions of others founded on the same or similar facts, and will moreover prepare him for proceeding in due time, conversely, from general propositions to facts by the method of deduction.

Whether such lessons in mechanics as have been suggested should follow or accompany Miss Youmans' "Lessons in Botany," or whether any other subject involving the notion of forces should be taken instead of mechanics, are questions which must be left to the judgment of the teacher.

Finally, it should be carefully noticed that the spirit of these remarks on elementary teaching will not have been appreciated unless it is fully understood that the change proposed is fundamental — even revolutionary.* It is intended to supersede the didactic, telling, explaining, condescending method which has long prevailed, by one in which the child's own intellect is recognized as the prime mover, and the exercise of his powers of perception and reasoning as the only means by which knowledge which can be truly called his own, is to be gained; by a method, in short, of self-teaching, under superintendence — a method which is rather the learner's than the teacher's.† The didactic method has had its day, and we see its results, which are generally "a farrago of facts partially hatched into principles, of exceptions claiming equal rank with rules, of definitions dislocated from the objects they define, and of technicalities which clod rather than facilitate the operations of the mind."[*] It is not too much then to say that this method quenches instead of quickening mental development. It does not give children credit for the powers they possess, and therefore fails to elicit them. It has nothing in common with that which Burke, in a well-known passage, characterizes as "incomparably the best,"[†] and which recognizes even the youngest child as an investigator, who has only to be set on the right path, and to be competently directed, to find out truths for himself.[‡] It cannot, therefore, be a means of that training of vital forces which, in the case of every human being, as an organism characteristically endowed with will, must, under competent direction, be ultimately wrought out by himself.

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* "The principle of connecting education with the laws of Nature is radical and is, as yet, little appreciated, and still less worked out. When admitted and carried into practice, it must revolutionize educational procedure, and is I believe, the only sound foundation for the education of the future, and the only method which can bring education into consonance with the method which has been so successful in scientific investigation." From *a MS. Lecture, one of a course on the Theory and Practice of Education, now being delivered by Mr. Lake, of the College of Preceptors, at the North London Collegiate and Camden Schools for Girls.*

† Very interesting illustrations of this kind of teaching may be seen in Mr. Wilson of Rugby's description of his method of making a class "teach themselves" physical science (*Essays on a Liberal Education*, p. 281), and in Professor Tyndall's description of the experiments at Queenswood College, in which he got his pupils to "find out Euclid" for themselves; a process by which they gained what he calls "self-power," and learned geometry as a "means and not a branch of education." — *Lecture on the Study of Physics, delivered at the Royal Institution*, pp. 202–204.

The great principles in short, (1) that knowledge is acquired by investigation, through observation and experiment, and (2) that the acquisition of it in this way, at first hand, constitutes the best training of the youthful mind, are seen to be in direct opposition to that which assumes the incapacity of the child to learn except by means of the direct communication of the teacher's knowledge, accompanied by the teacher's explanations and tellings, and which therefore supersedes and neutralizes the most fruitful employment of the child's faculties. That only is to be considered a fruitful employment of the mental faculties, and answering the true ends of education, which leads to enlargement of mental view, to the sharpening of the perceptive faculties, to the formation of habits of observing and investigating, to the strengthening of the memory, and generally to the development of intellectual power, not only as an object in itself, but as a basis for moral and religious character.

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[*] From a paper on "The Correlation of Learning and Teaching," read by the editor at one of the evening meetings of the Social Science Association. Numerous other illustrations and arguments bearing upon the general subject may be also found in his three lectures "On the Science and Art of Education, and Educational Methods," published by the Council of the College of Preceptors.

[†] "I am convinced that the method of teaching [or learning] which approaches most nearly to the method of investigation is incomparably the best; since, not content with serving up a few barren and lifeless truths, it leads to the stock on which they grew; it tends to set the reader [or learner] himself on the track of invention, and to direct him into those paths in which the author [or investigator] has made his own discoveries." — *On the Sublime and Beautiful.* It would be curious to inquire how many English Teachers, even those who have acknowledged the general truth of this remark, have ever practically applied it.

[‡] "Qu'il (the child) ne sache rien parco que vous le lui avez dit, mais parce qu'il l'a compris lui-même; *qu'il n'apprenne pas la science, qu'il l'invente.*" — ROUSSEAU, *Emile.*